Educational Theory

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LOGIC, THINKING, AND TEACHING

BY B. OTHANEL SMITH

MY PURPOSE IS TO EXPLORE THE PROPOSITION THAT LOGIC IS RELEVANT TO THINKING AND TEACHING, and that preparation of the teacher should include the study of what I shall call educational logic. I shall discuss three points: First, that in the course of separating psychology from philosophy, the logical basis of education was lost in the shuffle and that in consequence pedagogical thought became psychologized; second, that the reduction of thinking to psychological processes left us without an adequate criterion of disciplined reasoning and that such a criterion is to be found in logic; third, in order to give rigor to the educative process the teacher must himself have command of logic, and that therefore, teaching depends as much upon logic as it does upon psychology.

Logic and Psychology

At the outset I wish to say that by logic I mean inductive and deductive logic and along with it, semantics in its descriptive and philosophic sense. Logic is neither thinking nor thought. It has nothing to do with the creative processes. It does not tell us how we in fact do think, nor does it tell us how we ought to think. It is not a set of laws to be imposed upon thinking. It simply gives us the rules and techniques by which to assess the results of our mental efforts.

It is easy to see from what I have said that I hold logic and psychology to be different subjects. This view is out of step with that generally held in pragmatic educational theory wherein psychology and logic are meshed together to form a theory of problem solving. It conflicts also with the main line of the empiricist tradition stemming from Locke and Hume, which until about fifty years ago, held that logic and psychology were merely different ways of talking about the same thing. Logic supposedly described the processes of thinking; that is, the rules of logic were thought to be laws describing the way thinking actually occurred. Psychology as the science of the mind purported also to describe thinking processes. The fact that both of these disciplines claimed to do the same thing was seen in their mutual concern with questions about ideas or mental images.

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F. H. Bradley is usually given credit for entering the wedge between logic and psychology. In developing his own special brand of idealism, Bradley found it convenient to abandon ideas or mental images as the concern of philosophy. They did not provide the universality he required. In his view, images were mere mental events or psychic facts, having no independent existence or subsistence of their own. These were therefore in the domain of psychology. In Bradley's view philosophy was concerned with what was inferred from mental images. It dealt with their meanings and not with their occurrence. Now according to Bradley, that which is inferred from a mental image takes the form of a judgment. A judgment is not an idea or concept. The study of judgments and their relations is the task of logic. Hence the two subjects were entirely different—psychology dealing with mental events, and logic with inferences and judgments. Russell and Whitehead, in their mathematical logic, struck the final blow to separate logic from psychology.

In this country it was the psychologists who did the separating of logic from psychology—and this by radical surgery. At the very beginning of his epoch-making studies of learning, Thorndike formulated the laws of learning in terms of repetition. Ideas were replaced by the stimulus-response schema. A response became fixed to a stimulus by association through repeated contiguity of the two, in which the surviving response was selected by chance in the process of trial and error and reinforced by success. Thinking was thus reduced to a train of unitary stimulus-response reactions governed by the laws of readiness, exercise, and effect. Thorndike had apparently succeeded in demonstrating in miniature what Darwin claimed nature did on the grand scale. By variation, selection, and survival organic forms emerged. By trial, selection and survival of response the forms of behavior were determined. A hungry cat trying to get out of a box became the model of thinking and learning. Thus logic was completely undercut. To be correct was to be successful.

In Dewey's pragmatism events took a different turn. The Darwinian conception was Dewey's working model just as it was for Thorndike. But where Thorndike spoke of the stimulus Dewey talked instead of the perplexing situation. Yet both ways of talking had reference to observable circumstances of behavior. Instead of "learned behavior," Dewey spoke of the resolved situation, settled by appropriate modes of response. But at this point the parallel breaks down. To Thorndike there were no mental events between stimulus and response. There were only neurone connections. Dewey filled the gap with his Complete Act of Thought.

His formulation of the Complete Act of Thought included both logical and psychological elements. The first and third phase of the Complete Act, namely, the felt difficulty and the occurrence of suggested ways of overcoming it are psychological rather than logical. Phases four and five, that is, the examination of the grounds and the implications of the suggestions together with experimental testing of them are logical. The location and definition of the difficulty, constituting the second phase, appears to be a mixture of the two. While Dewey never abandoned this formulation, he did later modify his interpretation of it. In his major work on logic the Complete Act of Thought became the pattern of inquiry, and he there made it clear that he was concerned with the question of how situations were worked out rather than with thought. Indeed, Dewey was even doubtful that there was anything called thought as a psychical existence.

To Dewey the rules of inquiry constituted logic. These rules were formulated from a study of what people do when they seek to settle situations. Once formulated, the rules of logic then become the criteria by which other inquiries are to be assessed. They set the conditions which investigations must meet if their results are to be acceptable. When put in this way, Dewey's conception of logic is no longer a psychological one. For the rules do not describe the supposed mental processes. Rather, they constitute the norms for assessing results of inquiry and for checking upon proposed steps.

LOGIC AND RIGOROUS THINKING

Had the normative significance of Dewey's theory of inquiry been understood in pedagogical circles, the course of educational development might have been different. For one thing, we might have had a logical basis for developing in students the capacity to direct and control their own thinking. As it was, the slogan that we teach "how to think" and not "what to think" was largely empty. For the pattern of inquiry which Dewey had earlier called the Complete Act of Thought was taken to be a description of how thinking and learning in fact occur, and not as a set of norms for judging inquiry. The stripped-down model of thinking presently found in educational psychology texts and other pedagogical literature consists of the following phases: feeling uncertain, locating barriers to action, getting hunches and trying them out in imagination, acting upon the promising one, and deciding whether the action ended with the desired result. Now these are psychological. They describe what we do when as hungry cats we try to escape from our box. They may be fairly good descriptions of what we do, but the crucial point is left out—the basis for appraising results. Blind imitation of past performance is one thing, judging and improving it, another.

There is another important point: from the standpoint of psychology, these five steps do not necessarily involve the use of language; for behavioristic theory assumes that observable actions and not talking are the true index of psychological events. What men say is one thing and what they do, quite another. The psychologist trusts in the doing and rules out language as significant behavior. This mistrust of language is due partly to the fact that experimental psychology developed largely from the study of lower animals and partly to the discredited status of language as a result of its use in introspection which was repudiated. In any event, the mistrust of language by psychologists infected educational thought in spite of the obvious fact that both teaching and human learning are practically impossible without it.

If we look in educational literature for criteria by which to evaluate the steps we take to get out of the box, we find that we are admonished to be alert, careful, open-minded, and whole-hearted. This is not very helpful. In the first place, these terms are elusive and hard to pin down. How can we tell when we are sufficiently alert, let alone, when someone else is alert? If A says he is alert and B says no, A is not alert, by what criterion can we decide whose claim to accept? The same vagueness appears in the advice to be careful, open-minded, and whole-hearted. In the second place, these exhortations refer to ways of acting rather than to statements in which ideas can be formulated and tested. We can say that an individual is alert, careful, and so on. But it is a bit odd to say of a statement that it is alert, careful, whole-hearted, or open-minded.

Yet, since much of what we do—especially in matters of reasoning—is done with language, these vague psychological criteria are practically useless. They are useless in dealing with verbal formulations by which the logical soundness of thinking may be tested. Since they refer to ways of acting, these criteria are part and parcel of the psychological version of problem-solving, where results are tested in terms of success, and where success means to find a satisfying way out of a difficulty. But a mere state of psychological satisfaction offers no guarantee that we are not mistaken, nor that the way we solved the present problem might not lead to unsatisfactory consequences the next time we try it. Thus, the surrender of intellectual standards to psychology has all but robbed education of a theory of rigorous thinking.

By virtue of language and logic, thinking takes on a dimension in man different from that of the cat in the box. Man is a language-using creature; this fact opens to him spheres of experience not given to other creatures. A point so obvious might go without saying were it not for the fact that the epithets "merely verbal" and "verbalism" have dulled the edge of understanding where language and logic are involved in teaching and learning. The plain fact is that without language, nothing can be taught or learned about the past, nor about things removed from immediate observation. The laws of science can be learned only through language and retained in symbolic form alone. Without language the scientific method could not progress beyond the scramblings of the cat in the box. An adequate theory of control over our thinking will acknowledge the central role of linguistic behavior.

But unless a theory of disciplined thinking is based on logic, it is apt to emphasize language in its literary and sociable uses, and to neglect it as an instrument for directing the exploration of the environment and as a vehicle of knowledge. When this happens, the existential and logical monitors of our judgment are bypassed. Instead, we are exhorted to control our emotions—to prevent ourselves from being swayed unduly by prejudice and from losing our heads in anger, fear, or envy. But how can one tell whether or not he is controlling his feelings and prejudices, or whether someone else is doing so? Unless we are to fall back upon such vague and shifting psychological criteria as satisfaction and success, we must appeal to the norms of inductive and deductive logic. We know that one's feelings and prejudices do not interfere unduly with his thinking if he takes such precautions as these: uses a fair sample, recognizes what is true by definition, avoids fallacious reasoning, reduces ideas to observation sentences when an empirical test is to be used, and controls relevant conditions. The point of this analysis is that logical and not psychological criteria are used to judge the efficiency of such operations as these. Therefore the individual is disciplined in his thinking only to the extent that he has taken on the logical and linguistic criteria by which the intellectual work of man is brought under control.

Now I want to explore the ways in which the thinking of an individual can be said to satisfy logical criteria. His thinking meets these criteria, we would say, when the results of his verbal behavior—statements, arguments, descriptions, and so forth—correspond to the rules. But the matter is not so simple, for there are different ways in which verbal behavior is found to abide by these rules. Consider the case of a child learning his mother tongue. As he does so, the child's sentence structure will conform to that of the adults. The child is not aware of such things as linguistic rules. In the same way, the child's reasoning may be

said to conform to the rules of logic. His sentences may express valid arguments. This is rarely the case at an early age, but as the child progresses through the elementary school, he begins, though unconsciously and irregularly, to take on the forms of valid reasoning. In conforming to the rules, the child's reasoning is valid even though the idea never occurs to him that he should reason validly. He cannot verbalize the rules to which his reasoning corresponds. He has no words for talking about the rules of thinking or about mistakes in thinking. Hence his reasoning has not reached the threshold of conscious control. Now in cases of this sort we can say that the extent to which rules are satisfied at all, they are satisfied only by unconscious accommodation of behavior.

Let us now suppose that one who has learned to speak his native language goes to school and begins to study grammar. He is taught to classify words and to see relations among them in sentences. This gives him a set of words and rules for talking about language. He can then examine his own discourse and that of others to find and correct points where it fails to satisfy grammatical rules. But just as he can learn to use rules of grammar to guide his use of language, so can the individual learn to govern his own thinking and experimental investigations by using rules of reasoning and inquiry. He thereby acquires greater power over his own intellectual activities and clearer insight into those of others. For now he can rise above, survey, and assess them in the same sense that a referee rises above the game to judge the plays. This ability to perform at more than one level of the intellectual game, both to play it and to stand off and judge it, frees our thinking from unconscious habits conditioned by chance circumstances. Now when the individual examines his thought and brings it into line with criteria of effective thinking, we can say that this is a case of deliberate control, and is in direct contrast to unconscious accommodation.

Now I wish to make two qualifications. First, I do not wish to say that the individual is to make conscious use of logical rules every moment of his thinking. Constant mindfulness of these rules would be a serious impediment. It would have the same effect upon the thoughtful behavior of the individual as awareness of his feet was supposed to have had upon the march of the centipede. No one can act effectively if he is required at the same time both to perform and to think about whether or not he is performing correctly. But there are occasions when an activity can be improved by paying attention to its performance. Thus, one who is able to make deliberate use of rules when judgments about his own thinking or that of someone else are called for, is more apt to catch defects than one who has no command of logic. The disposition to use the rules when they count rather than the constant use of them distinguishes the discerning critic from the crass one.

The second qualification is about the rules themselves. It is usually thought that when one speaks of rules, he is talking about statements such as those in official rule books. But of course this need not be the case. Knowing rules does not mean knowing a particular set of words. The controversy over the teaching of formal grammar was not about the question of whether or not to teach grammatical rules. It was over the question of which rules to teach as well as the context in which the rules were to be taught, whether to teach them in relation to writing and speaking or as formally ordered elements in the official rule book.

When does one know the rules of a game, say, the game of checkers? Suppose

he says, "No, you can't make that move" when someone moves a man backward, and he says this on any occasion when that move is made. Should we say that he knows one of the rules of the game, even though he cannot give a sophisticated statement of it? I think we should claim that he does know the rule. So it is with the rules of logic. To know that affirming the consequent is invalid is to recognize such affirmation when it occurs and to recognize thereby that the truth or falsity of the conclusion is still up in the air. The particular verbal form in which the rule is put is of no consequence in playing the game or in refereeing it.

The analogy between the game of checkers and thinking breaks down at least in one significant respect. A player in checkers is always called for infraction of the rules; learning to play the game entails learning the rules. But with thinking it is different. A player in this game, except among professionals, can take all sorts of liberties without anyone calling him for infraction of the rules and without the player himself even knowing that he is breaking them. In some cases, however, he will pick up certain logical rules in an *ad hoc* sense. Suppose a beginning high school student is given the following argument: If it rains, the streets are wet. The streets are wet. Therefore it rained. He will tell you quickly that the conclusion does not necessarily follow because the streets may be wet for some other reason. Perhaps the street sprinkler has come along. But when the content is unfamiliar and the argument complex, the student will seldom recognize the fallacy. He may fail to recognize the fallacy as such, if his reasoning is still at the level of concrete relations. Hence he could not go beyond cases of particular content. Nor could he recognize the fallacy in any general sense. Hence if the material relations in an argument go beyond his concrete knowledge, the student who has only an *ad hoc* command of the rules cannot detect logical mistakes.

To recognize fallacies in a generalized sense is to see them in abstraction from any particular content. The individual is able to lay his finger on any instance of a particular fallacy and to tell what is wrong, even though he is not familiar with the subject matter. He can thereby use logical rules to monitor his own thinking as well as that of others. It does not require a formal study of logic and scientific method to give the individual such generalized control over his thinking and judgment. To be good at the game of thinking, one does not need to be a professional. At the professional level we find logicians and critics of logical and scientific systems. Here the individual can examine relations among rules, study them as a system, and propose changes in them.

To sum up the levels at which rules may be known, the first is the level of accommodation. At this level, the individual knows how to play the game of thinking, though he does not explicitly know the rules. At the next, the *ad hoc* level, the individual knows the rules only in a special context. At the third, or general level, we now add the ability to deal with the rules in their general applicability. Finally, at the professional level, the individual goes beyond the general grasp of the rules to a command of them as a formal system.

I believe that at best the rules of the game of thinking are now being learned in an *ad hoc* sense. Both in school and out, the individual simply picks up rules of reasoning from the material relations in the content he studies. I suspect that many persons play the game of thinking without even knowing that there are rules. The teacher plays it too, and often on the same level, checking the stu-

dents' thinking by the textbook, by what the teacher has himself been taught to be the correct answer, or by his own common sense notions of clear and accurate thinking.

LOGIC AND TEACHING

To continue a little longer in the metaphor, in the game of thinking the teacher is player, coach, and often referee. As a player, he engages students in thinking by asking questions and responding to their answers, by receiving questions and giving answers, and by many other devices and activities. In each of these there is a sort of give and take between teacher and students. But, having little knowledge of logic and being preoccupied with getting the student to understand facts and ideas, the teacher usually overlooks the logic of both his subject and of the class discussion. For instance, a history teacher discusses with his students the imperialism of a nation. He goes into the question of the extent and cause of the imperialism. But the concept of imperialism is not itself explicated, so that the students have varied notions of what is being talked about. The whole discussion is based on a vague and ambiguous term and thus thinking and learning are short-changed.

Now the teacher moves from the role of player to that of coach when he turns to the task of helping students work out a definition of imperialism. To handle this task, the teacher needs criteria by which to decide the adequacy of the definition worked out by himself and the students. As the teacher and students together analyze the concept of imperialism and give it the form of a definition, the teacher will help students from time to time to see what it means to define a term and to understand the kinds of rules by which the adequacy of a definition may be decided. He will show them, as appropriate occasions arise, that a definition lays down criteria for the use of a word, and that the definition we decide to give a word, or the usage we select, is related to the purpose we have in mind. He will show them that sometimes we define words by assigning whatever is named by the word to a class and then distinguishing it from other members of the class. On other occasions the teacher will show how to define words by pointing to instances, and in still other cases by reference to the operations we perform.

To reflect upon the work of the teacher is to see that there are many occasions when he could readily teach procedures of analysis and logical appraisal. He could teach how to distinguish between logical validity and empirical truth, how to tell when an argument is valid and when a proposition is true. Through his instruction students could learn how to identify assumptions, how to tell when conditions are logically necessary and sufficient, how to identify hypotheses and to tell whether or not they are confirmed by particular instances, and many other procedures too numerous to mention. In order to teach for effective thinking at this higher level of operation, the teacher must possess a working knowledge of logic in an amount far in excess of that picked up through his own incidental learning. This claim that the teacher should be trained in logic rests upon two premises: first, it is important to develop the student's ability to think critically; second, in order to develop this ability the student must be given experience in controlling his own thinking under the guidance of the teacher.

Logic is not only necessary in teaching the student how to control his thinking

but it is also an inherent part of teaching. Two lines of reasoning suggest this conclusion. In the first place, instruction in knowledge starts with an intent to arrive somewhere, to reach a conclusion. It is not a form of sociable conversation meandering wherever fancy leads. Rather it is studied discourse which aims not only at conclusions but also at showing the steps and reasons leading to the conclusions. This kind of discourse is logical. In trying to teach students to understand a conclusion and how it is reached, a teacher does not lead them down the blind alleys, detours, and mistaken paths which he himself may have taken, nor does he expose them to the false leads taken by the race. He strips off these mistaken moves, and starting at some take-off point, he tries to show by a chain of ideas that the conclusion is warranted.

In the second place, observation bears out the fact that instruction in knowledge involves logic. Even cursory observation of teaching will show that the teacher performs certain logical operations. He defines, interprets, explains, justifies, proves, evaluates. Now each of these activities is an operation done with words, sentences, and statements, and which we cannot perform without these linguistic instruments. Thus when we explain an event in science, we show it to be a special case of a law. In proving a proposition in mathematics, we show it to be a conclusion from a set of premises. When justifying our action, we given reasons to show that it is a wise step to take. In defining a word, we state the rules for using it. Now all of these operations fall in the domain of logic.

These operations are to be sharply distinguished from psychological processes. To talk about the operations of defining, proving, explaining, and so on, is not to talk about psychological events. Psychologists talk about certain processes: perceiving, emoting, conceiving, inferring, judging. Now it may well be that these proceeses occur when we prove a proposition or justify a course of action. But I do not think that teachers work with such processes even though they may be going on. Rather the teacher works with words and statements, their meanings and relations. He may decide that certain psychological events are taking place at a given moment, and so modify what he is doing. Still he is dealing with signs and symbols and performing the logical operations entailed by verbal instruction. So the changes he does make in his activities are largely changes in verbal behavior.

Some critics might object that my analysis presupposes an old-fashioned way of teaching and would then go on to make the point that nowadays no good teacher uses the methods of talking and telling. Instead of such verbal methods, these critics would say, the teacher engages students in problem-solving activities where they learn by planning and working out things together. It would then be said that the methods of involving and directing students in these activities require no special knowledge of logic on the part of the teacher. What he needs instead is suitable knowledge of human relations and skill in the techniques of group organization and control.

But it would be easy to show that the usual practice of teaching, especially in high school and college, is neither group work nor problem solving. Then, too, it can be shown that the assertion "a good teacher uses such and such methods" is logically circular because the meaning of "good teacher" may be interpreted to include "uses such and such methods." It is like saying all black cats are black. However, since these replies are not likely to convince the critics, I shall forego the pleasure of playing around with them.

Yet it should be noted that this objection to the claim that teachers need command of logic does not touch upon the point that the control of thinking involves deliberate use of logical rules. Such objection bears only on the claim that the acts of teaching are themselves logical operations. But, suppose it were the case that all teachers use problem-solving and group work. What would the teacher do in the classroom? If one insists that all learning is to result from problem-solving, or from instruction by one's peers through group work, what is the teacher's role? Is he no more than a mechanic who pushes psychological buttons to activate students and to keep them from getting out of hand? Of course not. The teacher who uses problem-solving and group work is inescapably involved in all the talking and telling that normally goes on in teaching. He must work with individuals and groups helping them to clarify meanings, to analyze and evaluate reasons and arguments, hypotheses and plans of action. The teacher helps students in testing the truth of statements about matters of act, and in dealing with many other linguistic and logical operations. Even in problem-solving and group work the teacher cannot do these things without talking, and he will be intelligent about his talking only to the extent that he exercises deliberate control over it.

You have probably been wondering for several minutes whether or not I am advocating a return to the study of formal logic by teachers. If the expression "formal logic" means symbolic logic, that is not what I have in mind. Although for teachers of physical sciences and mathematics, acquaintance with it is not undesirable. If the expression means deductive logic, that is part of what I mean. I would certainly not want everything that is traditionally taught in deductive logic to be included in courses for teachers. Nor would I want the logical training of the teacher to be limited to deductive logic. In addition, I would surely include inductive logic, semantics, and some elements of the philosophy of science. Logicians have made progress in ways of teaching their subject as well as in pushing back the frontiers of the subject itself. I believe that in most schools philosophy departments could be persuaded to give appropriate courses in logic for teachers. But the work given by departments of philosophy, while necessary, is not sufficient. That would merely be preprofessional training. In addition, there is need for work in educational logic as a part of our professional program. This is not the place to outline such work, but I shall say that the course should deal with the logic of teaching—defining, explaining, interpreting, proving, justifying, verifying, applying, and the like. And such a course should use actual activities, events, and instructional materials found in the classrooms of elementary and high schools. Teaching has so many logical aspects that no one should fear that educational logic would be empty and formal, detached from the work of the classroom.

My efforts to justify the claim that teachers should have command of logic may be inadequate. As is often the case, I feel more certain of my conclusion than I do of the defense I have made for it. This confession is not entirely without merit, for we sometimes gain by holding on to an idea long enough to find out whether or not sufficient evidence for it can be accumulated. I hope that I have succeeded in raising some new questions about the role of logic in teacher education. If I have done this, I can trust that you will continue to turn these questions over in your mind until the answers you give them are grounded in fact and theory.

THE SCIENTIFIC METHOD AND ITS IMPLICATIONS FOR EDUCATION

BY E. S. AND G. S. MACCIA

A MOST DEPLORABLE VIEW OF WHAT THE SCIENTIST DOES has become current in a great many people's thinking. The scientist is thought to be a glorified Sergeant Friday who goes about discovering "the facts nothing but the facts." No doubt education is partly to blame for this situation. As Woodger states:

> It is high time that the parts played in science by imagination, invention and faith—in addition to observation and experiment—were more widely recognized and understood. Ignorance in such matters breeds dogmatism and intolerance, both of which ill become the scientist.[1]

Might we not also add that ignorance in such matters does not breed theoretical scientists who are so important in our society as they furnish some of the tools for the control of environment. Therefore, it appears imperative that we get straight what the scientist really does and what education's role in the matter really is. Thus, the purpose of this paper is twofold: first, to set forth the nature of the scientific method and second, to set forth implications for education.

When we reflect upon what scientists do we find that one of their most conspicuous activities is the making and recording of observations which may or may not involve experimentation; that is to say, one of the most conspicuous activities of scientists is discovery. They observe a rise in a column of mercury, a precipitate that has formed in a glass vessel, the white coloring of a swan or innumerable other facts. Usually the scientist employs experimentation rather than mere observation of the normal course of events. He deliberately disturbs the normal course of events and thus increases the range of his discovery of facts. For example, the white coloring of a swan is usually a matter of mere observation, but the rise in a mercury column or a precipitate that has formed in a glass vessel is usually a matter of observation arising from a situation designed by the scientist in which certain facts are suppressed—controlled—so that others may be observed in their interrelationship. There is little need to extend this part of the discussion of what the scientist does, for the cliche, "Science is based on observation and experiment," is so familiar to us all. In fact, it has become the "be all" of science which is precisely the point this paper is arguing against.

Another activity of the scientist that is not usually over-looked is the generalization of observation. From the observation of many white swans, the scientist concludes that all swans are white. Induction or the transition from propositions pertaining to some cases to propositions pertaining to all cases occurs. Or the observations may be generalized by means of statistical procedures. Thus, the

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[1] J. H. Woodger, *Biology and Language* (Cambridge: University Press, 1952), p. 61.

scientist can be said to establish scientific laws or statements of constant-conjunction.

But the scientist also does other and less obvious things. Perhaps because they are less obvious they are often overlooked. It is the bringing of these less obvious things to your attention which is of utmost importance. If we stop at this point, we have indeed a meager view of the nature of scientific method. It is a view that embraces only what the scientist does in the laboratory. Indeed, experimental science does consist in observations and generalizations of such observations, but what of theoretical science? Are scientists no more than discoverers? As Professor Werkmeister has stated: "Observation, . . . inductive generalizations, and statistics . . . by no means constitute the whole of the scientific method. In a sense, they are preliminary steps or "tool devices" for the real task of science."[2]

What, then, is the real task of science? The answer to this question that immediately comes to mind is that science's real task is the explanation of the facts which have been observed and generalized in the form of laws. Genetics explains the distribution of the blood groups; the Bohr model of the atom explains the lines in a spectrum. But are not the concepts—gene, electron—merely shorthand for the facts that fall under them? Are not scientific theories merely another way of stating the facts? This is the operational view. An electron is a logical construction out of the observed events by which their presence can be detected. If this view could be accepted, then clearly the view of what the scientist does that has been developed thus far is not really meager. After all, the restatement in shorthand of the facts that have been discovered requires only a scientific stenographer well-versed in scientific symbolism. The real essence of the scientific method would be the discovery of the facts and their generalization in the form of laws.

SCIENTISTS AS DISCOVERERS AND CREATORS

However, there is something radically wrong with this view. Braithwaite in his excellent treatise, *Scientific Explanation*,[3] has clearly pointed out the difficulty. If scientific theories are merely summaries of the facts, they can have no prospective reference. Prediction is impossible. For example, if your definition of mass is operationally exact it is too narrow to allow you to discover that mass is also equivalent to energy. The concepts must be richer than any construction out of known facts. The scientist must do something more than merely discover, summarize, and restate facts. In the words of Frank:

> Whereas experimental science describes the properties of bodies as given by our senses, and the changes in their properties, the task of theoretical science is to provide bodies with fictitious properties. . . . Theoretical science is not research but a sort of remodeling of nature; it is a work of imagination.[4]

Scientists, thus, are more than discoverers. They are creators. They are not mere recorders but are the creators of what Professor Werkmeister has designated as the ultimate task of the scientists "the functional integration of experience."[5] They arrange through imaginative construction our experience so that it is compact and coherent. A hypothetico-deductive system is created through the invention

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[2]W. H. Werkmeister, *The Basis and Structure of Knowledge* (New York: Harper and Brothers Publishers, 1948), p. 299.

[3]R. B. Braithwaite, *Scientific Explanation* (Cambridge: University Press, 1953).

[4]Frank, *Modern Science and Its Philosophy* (Cambridge: Harvard University Press, 1949), p. 57.

[5]Werkmeister, *op. cit.*, p. 299.

of hypotheses; a system that includes observable fact but is more than observable fact and consequently allows prediction of other observable facts. Stated differently, the scientist, the discoverer, who has become aware of certain facts and has generalized these facts becomes now the creator and by inventing hypotheses constructs a system to explain these facts and to allow prediction of new facts.

However, to understand this important aspect of what a scientist does, let us take a closer look at a hypothetico-deductive system. Such a system is one in which observable consequences logically follow from the conjunction of observed facts with the set of fundamental hypotheses of the system. Its structure is essentially hierarchical or pyramidal in nature. At the apex are the higher-level hypotheses which usually connect very abstract concepts such as wave function, organizers, etc. By "very abstract concepts" we mean "concepts that cannot be represented pictorially and are usually of the nature of mathematical symbolism." As Carnap has put it:

> If we demand from the modern physicist an answer to the question what he means by the symbol 'ψ' of his calculus, are we astonished that he cannot give an answer, we ought to realize that the situation was already the same in classical physics. There the physicist could not tell what he meant by the symbol 'E' in Maxwell's equations. . . . we understand 'E,' if 'understanding' of an expression, a sentence, or a theory means capability of its use for the description of known facts or the prediction of new facts. An 'intuitive understanding' of 'E' into terms referring to observable properties is neither necessary nor possible. The situation of the modern physicist is not essentially different. He knows how to use the symbol 'ψ' in the calculus in order to derive predictions which we can test by observation. . . . He possesses that kind of understanding which alone is essential in the fields of knowledge and science.[6]

From the apex we proceed deductively to lower order hypotheses until we finally return to observed fact. If the facts we deduce are verified, then we believe our concepts and hypotheses to have meaning.

It is important to recognize a source of confusion regarding the nature of hypotheses which in part is responsible for our failure to realize the role of creativity in the scientific method. How many of us have been told and have read that the hypothesis of evolution is a fact! Clearly, once a hypothesis always a hypothesis, for a hypothesis is a statement which goes beyond any attainable data or facts. We may call it a fact, but that is only because we believe more strongly in it due to verification of observables deduced from it. The term "fact" here is being used in a different sense and so should not obscure the creativeness of the scientist, Darwin.

We have seen that the scientist is both discoverer and creator. He employs both induction and deduction. He is a Bacon, but he is more. He is a Galileo. In the words of Woodger:

> It is easy to see that *if* there were no distinction between deduction and induction, *all the statements of a theory*, or *conjunctions of them*, *would be analytically equivalent to* one another, we should be replacing an asymmetrical relation by a symmetrical one and the structure of the theory would be entirely altered. Moreover, there would be no need for imaginative and inventiveness in scientific research; it would be as easy as falling off a log.[7]

Since the task of the scientist is not as easy as falling off a log, education has a very definite role to play.

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[6]R. Carnap, *Foundations of Logic and Mathematics*, International Encyclopedia of Unified Science, Vol. 1, no. 3.

[7]Woodger, *op. cit.*, p. 55.

THE ROLE OF SCIENTIFIC METHOD IN EDUCATION

What, then, is the role of education? Clearly, if the scientific method includes both observing and inventing, then certain tasks must face the educator; that is, the nature of the scientific method has certain implications for education. It has implications for the education of the consumer of science. He must understand what the scientist is about—that the scientific method is one of discovery and creation. It has implications for the education of the potential scientist. He must be taught to be both a discoverer and a creator.

But these statements are vague to say the least. In order to make them more significant for education they must be implemented by more precise suggestions. Let us see how our consumer of science and our potential scientist fares in his science classrooms. Perhaps his education is adequate, but if it is not—and you will see shortly it is not—precise suggestions to provide more adequate education in science will be presented.

A visit to many classes in elementary science and an examination of instructional materials reveals that "the purpose of science teaching in the elementary school lies not so much in starting boys and girls on the road to becoming scientists and naturalists as in training them to become educated laymen."[8] To this end they are taught about science and about what the scientist does.

However, what they are taught depends to a large degree upon the teacher's grasp of science and its method. Unfortunately many teachers' grasp does not extend beyond the simplified account given by Conant in a chemistry text:

> Scientists collect their facts by carefully observing what is happening. They group them and try to interpret them in the light of other facts that are already known. Then a scientist sets up a theory or picture that will explain the newly discovered facts, and finally he tests out his theory by getting more data of a similar kind and comparing them with the facts he got through the earlier experiments. When his theory does not quite fit the facts, he must modify it and at the same time verify the facts by getting more data.[9]

They, unlike Conant, do not realize that:

> The simplified account . . . serve(s) only to confuse a layman. The basic fault is a failure to distinguish between two closely related activities which together have made the history of science possible. . . . These were abstract reasoning, as represented by Euclidian geometry, and experimentation, as represented by the work of the metallurgists who over the generations had improved the methods of winning metals from the ores.[10]

Thus, the confused teacher instead of producing educated laymen turns out confused laymen.

This becomes apparent when we take a look at what goes on in the science activities of the elementary pupil. Generally, science activities emphasize the acquisition of information and the refinement of observation. The actual content of the science curriculum varies with the particular teaching programs, geographical localities, the seasons, the inclinations of the teacher, and sometimes the special

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[8] *Science in the Elementary School* (Sacramento: California State Department of Education, 1945), p. 9.

[9] James B. Conant, *Modern Science and Modern Man* (New York: Doubleday Anchor Books, 1953), p. 36.

[10] *Ibid.*, pp. 37–38.

interests of the children. Most often science curriculum is taken to mean the observation and care of plants and animals, and the construction of models and mock-ups. Great pains are taken to have the children develop their perceptual abilities. They chase drops of mercury about the table top with their fingers, polish coins by amalgamating mercury to silver, feel the textures of various plants and animals, and thrill to the vibrations of a tuning fork. By means of class projects an attempt is made to bring some measure of control into the children's observations. After all their explorations and experimentations, children memorize teacher-presented simplified explanations about what they have experienced. Extensive use is made of pictorial representations of scientific explanations, some of them are quite fanciful. The teacher is careful to see that the "correct" explanation supplants any that the child may put forth. In doing so the teacher supplants "established fact" for creativity.

Is this adequate science education? True, the elementary school children learn that observation is part and parcel of the scientific method and that observation must be controlled. Also they are given some opportunities to develop manipulatory skills. But they are not provided with much opportunity to exercise scientific creativeness. With the teacher's help could not the children be led to some understanding of the creative side of the scientific method? Surely "case studies" of the evolution of some of those scientific theories they are taught to glibly recite could be part of their science curriculum. Might it not also be possible in the higher grades to introduce experiments which require some creativeness? A deliberate selective factor might be introduced which would cause an expected result not to occur. For example, in experimenting with sound transmission in a vacuum, why not deliberately mount the bell on a rigid support connected to the base of the bell jar? Of course, sound will be transmitted. This should start the child wondering, questioning, and explaining. To be sure this is not high-level conceptualizing. But at least it is a beginning in scientific creativeness. Finally, we can not hope to make our children intelligent consumers of science—much less potential scientists—if the trend toward pictorial representation and away from mathematics is not arrested. In the advanced stages of theory construction, mathematics not pictorial representation provides the fruitful ideas. Mathematics is the conceptual tool of the scientist. Of course, we are not suggesting that the elementary school child will or should attempt high-level theory construction, but some attempt for the inclusion of mathematical statements in elementary science should be made. At the very least we should expect the elementary student to attain an adequate knowledge of ratio and proportion. With this tool the child in the upper elementary grades could then begin to bring mathematics to bear in a larger measure than he now does on his scientific discoveries.

In the secondary school the desired outcomes for science education follow closely those set forth for elementary science. The emphasis is upon the development of an intelligent consumer of science; that is, upon the educated layman. Some attention is given to the potential scientist. After he has had the required survey courses, he can select such courses as physics, chemistry, and biology.

MEANINGFUL SCIENCE SURVEY COURSES

Since the survey science curriculum is intended for all students as a preparation for their role as educated laymen, let us see what goes on in these courses. Unfortunately what goes on is precisely this: the student learns about science but learns little or nothing about what the scientist does. The teacher's main effort is

expended in setting forth scientific information. Occasionally the student carries out an experiment, but more often he observes a teacher's demonstration or a motion picture of a demonstration. But these so-called experiments and demonstrations serve only one purpose, the illustration of scientific information. Discovery activity is reduced to filling in blanks of a science workbook. The textbook too—outside of a few introductory pages that usually present an erroneous picture of what the scientist does—is geared solely to the acquisition of scientific information. Undoubtedly the layman if he is to understand science must know what it is about, but he is only half-educated if he does not know what the scientist is about.

What then can be done in these survey courses? We might well follow the suggestions of James B. Conant that he offers in his book, *On Understanding Science.*[11] The case study approach herein expounded should provide the student with a grasp of both the observing and creating phases of the scientific method.

But what of the potential scientist and his education? Since in its early stages the education of the potential scientist at the college level follows the same pattern as that of the high school level, let us consider them together. Again education is inadequate. Serious mistakes are being made.

First, there is a reduction of the mathematical content of science courses. This reduction is probably a consequence of the wide range of abilities usually found in high school and lower division college science classes. A sincere attempt is being made to make science material comprehensible to all. In doing so, greater reliance is being placed upon pictorial representation and verbal description. The result, however, is that the potential scientist is denied his most basic tool. He cannot realize fully the deductive aspect of the scientific method. Minimizing or eliminating mathematics from the study of the sciences is a fatal error. If wider use of mathematics in science courses necessitates a separation of the swift from the slow, so be it. Whatever courses are selected and however learning activities may be arranged, with Whitehead we assert, "Let there be mathematics all the time."[12]

Second, there is a failure to utilize the laboratory as a place where the potential scientist learns what he must do as a scientist. Laboratory practice at this level of science education provides little more than a new setting for the acquisition of scientific information. Laboratory experiments are selected and set up in such a way that it is practically impossible to obtain anything but the expected results. The student becomes neither a discoverer nor a creator. He does not become a discoverer because he often finds it easier to obtain a grade through the "correcting" of his data to bring them in line with the results he is told to get than through the perfecting of his observational technique. Should not the laboratory be a place where the potential scientist learns how to discover through experimentation? He does not become a creator because he does not encounter the unexpected in the laboratory which would necessitate attempts at explanation. The explanations are given. He has but to carry out the experiment that illustrates the given explanation. Should not the potential scientist encounter the unexpected and be encouraged to provide his own explanations which would suggest further experimentation? For example, instead of carrying out the usual experiment which illustrates that water boils at 100°C. at 1 atmosphere of pressure, the student could be directed

[11]Conant, *On Understanding Science* (New York: Mentor Books, 1951).

[12]Alfred North Whitehead, "Science in General Education," in *Essays in Science and Philosophy* (New York: Philosophical Library, Inc., 1947), p. 196.

(*Continued on page 248*)

THE NATURE AND FUNCTION OF THEORY IN EDUCATIONAL ADMINISTRATION

BY JOHN WALTON

IN THE CURRENT LITERATURE ON EDUCATIONAL ADMINISTRATION one finds an increasing concern about the lack of basic theory. However, little has been done to define the type or types of theory that are desired. This inquiry into the nature and function of theory aims at a description of several types of theory that may be used and a prediction of the functions they will perform. It is written, therefore, somewhat in the nature of a theory of theory; or, to borrow a technical term from philosophy, it is metatheory with which we shall be dealing. The function that each type of theory is expected to perform will be illustrated by its application to administrative problems and situations.

Without paying consistent attention to continuity in the historical development of theories, we shall first look at some types of intellectual activity that are currently labeled theory. That there is disagreement about kinds of speculation that should be named "theory" should not deter the student of the subject of educational administration from attempting to discover the value of each kind for the study of his subject.

If we begin by examining the word "theory," we find that its etymology throws a revealing light on the circumstances of its origin. It is derived from the Greek word "*θεωρία*" which means "a viewing," "a looking at," "contemplation," or "speculation." In Greek, and in one of its obsolete English uses, the word means a "sight," or "a spectacle" also.[1] Thus, in the beginning, the word referred to objects and events, or to the primary act of observing phenomena.

Although current definitions of theory have evolved from this primitive meaning of viewing or observing, through the concept of speculation or "theorizing," to the present one of a conceptual scheme or system of ideas that is held as an explanation of account to a group for facts or phenomena, the word in its original sense probably has great value for the study of educational administration. While this is not the place to discuss what might be called a non-theoretical approach, it is important to point out that, since the phenomena of administration have not been identified and defined unambiguously, there is a great need for a systematic observation of the things that are labeled administration.

Not the simplest or the most elementary, but perhaps the most common, kind of intellectual activity that is labeled theory is conjecture about particular facts that are not reasonably clear. One may hold, for example, the Hitchcock or Herndon theory of the parentage of Nancy Hanks, i. e., that she was born in lawful wedlock to Joseph and Nancy Shipley Hanks; or that she was the illegitimate child of Lucy Hanks and a now nameless Virginia planter. Or one may con-

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[1] *Oxford English Dictionary* (Oxford, 1933, Vol. XI, p. 278).

jecture that William Torrey Harris would have approved of the core curriculum had a program of studies by that name been introduced during his lifetime. Although this kind of theory cannot lead directly to general laws, it is of great importance in that its proof may be extremely interesting; and it may contribute indirectly to the proof or disproof of a more general theory by establishing facts. Even if theories or conjecture about particular facts are incapable of proof at the time, they may be important; the means of testing them may come to light or be devised. One may well conjecture in vain about what the other side of the moon looks like, until space travel discloses whether or not the conjecture is true. That an administrative act has so far eluded accurate description should not discourage students from speculating about what it is. Such curiosity may hasten the discovery or invention of means whereby the nature of administration may be described approximately, if not accurately.

THEORY AS PRIMITIVE INTELLECTUAL ACTIVITY

One of the most pervasive of the current definitions of theory includes an extremely primitive kind of intellectual activity—that of postulating an entity or the coming to react constantly to such an entity, which is in reality a chaotic flux of stimuli. With this definition, the psychologist Edwin G. Boring has pushed the act of theorizing back beyond the mind of man:

> Surely before man animals had scientific theories, generalizations about variable nature. Here I am suggesting, with the contributions of Gestalt psychology in mind, that an object is a theory about an invariance in ever changing and chaotic experience. Since size constancy has been found for chickens and apes, it is plain that they know how to make the basic classifications of objects as to size, that they act in accordance with a theory of the invariance of objective size.[2]

The above definition extends theory to sub-human minds and to the instant in which objects or events are identified, distinguished from other objects or events, or from the indeterminate flux of experience, and given some kind of conceptual status. The distinguishing factor in the illustrations given above was invariance in size, but the theory might have postulated any one or a number of characteristics by which the object might have been identified. Although it may be somewhat far-fetched to compare the theorizing of apes about the size constancy of objects as a means of identifying these objects to the attempts of the human mind to identify the phenomena of events of administration in the chaotic world of human experience, the analogy may have some value for the study of the subject. The present emphasis on theory as applied to relationships between concepts and the current relaxation of philosophical tension about the matter of definition, may have obscured the value of this earlier type of theory for the study of subjects of a variable and ill-defined nature. The study of educational administration, therefore, may profit from the type of theorizing that postulates particular events in such a way that they can be recognized.

Let us examine more closely how this type of theorizing may be applied to the current stages of inquiry in some modern studies. Obviously, its first function is that of definition, of distinguishing some object or event from all other objects or events, or from the undifferentiated continuum of experience. There are many

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[2]Boring, Edwin G., "The Role of Theory in Experimental Psychology," *The American Journal of Psychology*, April, 1953, Vol. LXVI, p. 175. The author is indebted to Professor Boring for his classification of theories into classificatory, analytical, and descriptive.

modes of definition. One is to accept the phenomena already labeled administration, intelligence, or proper names, for instance, as a starting point to delimit roughly the original field for subsequent analyses. Another might be to begin with an example from the field, such as decision making for administration, ability to manipulate verbal symbols for intelligence, or Keziah for proper names. A third, and one in common use in the science, is that of operational definition. Bridgman has explained this kind of theory as follows:

> A term is defined when the conditions are stated under which I may use the term and when I may infer from the use of the term by my neighbor that the same conditions prevailed.[3]

By applying definitions to terms Bridgman has restricted the subject somewhat, but since we shall be concerned almost entirely with terms, with concepts expressed in language, as contrasted with the apes, the restriction means little. The problem of infinite regress, i.e. of the necessity of operational definitions of the terms that are used to describe the conditions under which the term to be defined may be used, and so on until one is forced to point to the phenomena that are being identified, does not seem to be peculiar to operationism. Moreover, in actual practice, the use of less ambiguous terms to set forth the conditions under which the term being defined may be used would represent a gain in the clarity of the definition.

THEORY AS DEFINITION AND SYSTEMATIC CLASSIFICATION

Turning now to some concrete illustrations of the function of theory as definition, we find a good example in the field of linguistics. In a monograph entitled *Theory of Names*,[4] the purpose of which is to define the term "proper name," the author concludes with the following:

> I therefore submit the following definition (in terms of function, not of form) for proper name: A proper name is a noun used κατ' ἐξοχήν in a non-universal function, with or without recognizable lexical value, of which the potential meaning coincides with and never exceeds its actual meaning, and which is attached as a label to one animate being or one inanimate object (or to more than one in the case of collective names) for the purpose of specific distinction from a number of like or in some respects similar beings or objects that are either in no manner distinguished from one another or, for our interest, not sufficiently distinguished.

Here is an attempt to define a set of conditions that applies uniquely to the phenomenon which is called "proper name;" and it is a definition that is designated "theory."

Although numerous attempts have been made to define administration, and there seems to be substantial agreement among the definitions, much remains to be done in making them clear and unambiguous. A few examples from the field of both public and educational administration are submitted.

> When two men cooperate to roll a stone that neither could have moved alone, the rudiments of administration have appeared.[5]

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[3]Bridgman, P. W., "Some General Principles of Operational Analysis," *Psychological Review*, Vol. 52, September, 1945, p. 246. The entire issue is devoted to a symposium on operationism.

[4]Pulgram, Ernst, *Theory of Names* (Berkeley, California: American Name Society, 1954), p. 49.

[5]Simon, Herbert A., Donald Smithburg, and Victor A. Thompson, *Public Administration* (New York, 1950), p. 3.

Public administration is concerned with the arrangement, organization, and interrelations of executive departments and agencies, but it includes much more than these structural considerations. The real core of administration is the basic service which is performed for the public works, education, recreation, sanitation, social security, agricultural research, national defense, and others.

. . . just as the science of politics is an inquiry into the best means whereby the will of society may be organized for the formulation of policy, so the science of public administration is an inquiry as to how policies may be carried into operation.[6]

. . . . .

Administration has to do with getting things done; with the accomplishment of defined objectives. The science of administration is thus the system of knowledge whereby man may understand relationships, predict results, and influence outcomes in any situation where men are organized at work together for a common purpose.[7]

. . . . .

It [administration] is the function within an organization which is responsible for establishing its objects, purposes, aims or ends, for implementing the necessary organizing and operating steps, and for assuring adequate performance toward the desired end.[8]

. . . . .

Administration is the capacity to coordinate many, and often conflicting, social energies in a single organism, so adroitly that they shall operate as a unity.[9]

. . . . .

. . . school administration may be defined as the selection, appointment, and assignment of the school's employed personnel, and the coordination and leadership of all school-associated personnel-employees, pupils, board members, and members of the community—in creating, executing, and improving policies which make for sound and efficient education. Personnel—its procurement, coordination, and leadership—is one main element in this definition. Policies—their creation, implementation, and improvement—comprise another. Achievement of sound educational goals is the third.[10]

. . . . .

In common usage, the term administration is roughly synonymous with that of management. In its proper use in education, it means much that we mean by the word government and is closely related in content to such words as superintendence, supervision, planning, oversight, direction, organization, control, guidance, and regulation. Besides referring to the process or activity of managing people and materials, the term is regularly used to designate the person or persons, the officials in charge of the activity.[11]

Administration is a hierarchy of subordinate-superordinate relationship within an institution. In this relationship three dimensions are of critical importance: (a) the authority dimension, that is the source of the superordinate's dominance and the subordinate's acceptance of it; (b) the scope dimension, that is the range of the roles

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[6]Merson, F., "Public Administration: A Science," in Nigro, op. cit., pp. 1–2.

[7]Gulick, Luther, and L. Urwick, *Papers on the Science of Administration* (New York, 1937), p. 191.

[8]Tead, Ordway, *The Art of Administration* (New York: McGraw-Hill Book Co., 1951), p. 100.

[9]Adams, Brooks, *The Theory of Social Revolution* (New York: The Macmillan Company, 1913), pp. 207–208.

[10]Pittenger, Benjamin Floyd, *Local Public School Administration* (New York: McGraw-Hill Book Company, 1951), p. 7.

[11]Sears, Jesse B., *The Nature of the Administrative Process* (New York: McGraw-Hill Book Company, 1950), p. 4.

and facilities legitimately included within the interaction. These must be functionally specific rather than functionally diffuse; (c) the affectivity dimension, that is the distinctive character of the personal relationships.[12]

From even a cursory review of the above definitions two facts are apparent: (1) there seems to be some common elements in most, if not all, of them; and (2) the study of administration would profit from more precisely formulated definitions. It is here that theory as definition can contribute to the development of the subject.

Closely related to theory as definition and following immediately upon it, is systematic classification, in which constructs are used as classificatory concepts for data that are observed. Any phenomenon that met the requirements of proper names as outlined above would immediately be recognized as a proper name. Likewise, if we had an unambiguous definition of administration, we would be able to recognize and classify phenomena that met its conditions as administration. As a matter of fact, we are able now to do this to some extent, but there are borderland areas in administration which constitute a difficult realm for the student where policy-making, for instance, is classified as a part of administration by one student and not by another. The extension of definition to classification should soon yield a body of data that could be recognized, classified, and used unambiguously as the phenomena of administration.

ANALYTICAL AND DESCRIPTIVE THEORY

Analytical theory is another approach to the study of administration that may be useful. The breaking down of the whole into its parts has been fruitful activity in chemistry and psychology, and it marks the beginning of the systematic study of administration. In psychology, the analysis of personality into traits, needs, and abilities,[13] and the analysis of mind by the mathematical treatment of experimental data obtained from intelligence tests[14] have been an important procedure in the development of advanced study.

The classic example of the study of administration by this method is Henri Fayol's attempt to analyze the phenomenon into its separate function—planning, commanding, coordinating, and control.[15] Gulick[16] extended Fayol's analysis to get POSDCORB—

Planning, that is working out in broad outline the things that need to be done and the methods for doing them to accomplish the purpose for the enterprise.

Organizing, that is the establishment of the formal structure of authority through which work subdivisions are arranged, defined, and coordinated for the defined objectives.

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[12]Chase, Francis S., and Egon G. Guba, "Administrative Roles and Behavior," *Review of Educational Research*, Vol. XXV, No. 4, October, 1955, p. 282. Quoted from Arthur P. Coladarci and Jacob W. Getzels, *The Use of Theory in Educational Administration* (California: Stanford University Press, 1955).

[13]See R. B. Cattell, *Description and Measurement of Personality* (Yonkers-on-Hudson: World Book Company, 1946), p. 4.

[14]See Godfrey H. Thomson, *The Factorial Analysis of Human Ability* (Boston: Houghton, Mifflin Co., 1939).

[15]See L. Urwick, *The Function of Administration* in Luther G. Gulick and L. Urwick, *Papers on the Science of Administration*, p. 119.

[16]"Notes on the Theory of Organization," *Ibid.*, p. 13.

Staffing, that is the whole personnel function of bringing in and training the staff and maintaining favorable conditions of work.

Directing, that is the continuous task of making decisions and embodying them in specific and general orders and instructions, and serving as the leader of the enterprise.

Coordinating, that is the all important duty of interrelating the various parts of the work.

Reporting, that is keeping those to whom the executive is responsible informed as to what is going on.

Budgeting, with all that goes with budgeting in the form of fiscal planning, accounting, and control.

In educational administration similar analyses have been made by Sears,[17] and by Hagman and Schwartz.[18] Somewhat different elements have been postulated by Chase,[19] who has analyzed administration as policy making, giving effect to policy, consultation on the basis of special knowledge, and adjudicating. Such analysis will doubtless continue, but the trend will probably be in the direction of more empirical verification of the elements that are postulated than has characterized the somewhat arm chair theorizing in the past.

The next type of theory to be discussed we shall call descriptive theory. Illustrative of this type of theorizing in educational administration are some of the metropolitan school study reports. Statements of relationship such as those listed below, whether they were intended to fall within this category of theories or not, apparently do so.

Good schools prosper in an atmosphere of permissiveness.

Good schools prosper in an atmosphere of easy communication with administration.

Schools prosper in communities in which the hundreds of voluntary groups of citizens discover that interest in shaping the schools to serve the community pays off in great satisfaction to the lay participant as well as the improvement of schools.

Schools prosper when administration and community help teachers grow in strength and power through the years—through participation in community affairs, through travel, through study, through the availability of salaries adequate enough to permit them to dress as other people, to buy the books they want, and to provide for their families as other people engaged in important enterprises do.[20]

The relationship expressed in the last statement may be expressed more clearly as follows:

In communities where teachers are given an opportunity to travel, to buy books, and to provide adequately for their families, schools are better (criteria are not given, but it is assumed that there are such) than where these opportunities are not available.

If the criterion of good schools is pupil growth in subject matter, newer methods of teaching, or any other standard, we might find that this criterion is associated

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[17]Sears, Jesse B., *The Nature of the Administrative Process* (New York: McGraw-Hill Book Co., 1950).

[18]Hagman, Harlan L. and Alfred Schwartz, *Administration in Profile for School Executives* (New York: Harper and Brothers, 1955).

[19]Chase, Francis S., "New Program in Administration," *The Elementary School Journal*, February, 1955, p. 311.

[20]Mort, Paul R., "Schools That Will Prosper," *Nations Schools*, Vol. 42, October, 1948, pp. 45–46.

with high salaries for teachers in a sufficient number of cases to predict fairly accurately that wherever we find high salaries, we shall find superior pupil achievement or some other attribute of good schools. And the inference would be almost irresistible to some that higher teachers salaries are responsible for the excellent academic performance of the students. But such causal explanation is not warranted by the theory, which attempts only to describe the phenomenon of the association, not to explain it. The socio-economic status of the parents in the community could account for both the high salaries, and for the excellent academic scores of the students. Descriptive theory in educational administration may serve a useful purpose as an index, but it is incumbent upon those who employ it to point out its limitations.

EXPLANATORY THEORY

The type of intellectual activity that is most congenial to scientific investigations is explanatory theory.[21] The form that explanation invariably takes is: let Q be the thing to be explained (the explicandum); then an explanation of Q will take the following form: Because P; and if P, Q.[22] Substituting a phenomenon for Q, we may get something like the following: Because teachers can expect annual increments in salary their morale will be higher than if they did not have such increments to which they could look forward; and if teachers can look forward to salary increments, their morale will be higher than if they cannot. This explanatory theory of high morale among teachers, if true, may be invoked to explain high teacher morale and it may be used to inform us how we may improve teacher morale. Annual salary increments are not only associated with high morale according to this theory; they are also capable of bringing about an increase in teacher morale.

Moreover, as we attempt to explain why some teachers have higher morale than others, we are not dealing directly with empirical facts, but with generalizations and relations between concepts. In our theory we have the concepts "teacher," "salary," "increment," "morale," and "better," which have been invented prescriptively to name and identify the various phenomena. Furthermore, however glibly we employ the terms in the above theory, it contains two obscure elements: the definitions that created concepts, and the method prescribed for deciding what empirical entities shall be regarded as exemplifying the created concepts. We are likely to overlook in dealing with these familiar concepts—"morale" excepted, perhaps—that, at one time, they were abstracted from experience and differentiated from all other phenomena by the type of theorizing that we have called "generalized description;" and that now, in our explanation of a phenomenon, we are required to use them not only to refer to empirical events, but also as concepts possessing relationships to one another.

In addition to concepts that stand relatively unambiguously for some empirical event, theory today finds it fruitful to use concepts that are not well defined and with mere constructs in the form of intervening variables—designata for postulated

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[21] C. J. Ducasse in "The Nature and Function of Theory in Ethics," Vol. LI, October, 1940, p. 26, divides such theories into two classes: "causal" and "conceptual," but since both presuppose cause, the author prefers to classify all such theories as causal. All the terms in theory are classified as concepts, whether they refer to some empirical event or whether they are simply constructs.

[22] *Ibid.*, p. 22.

causes that are not observable. At least one student in psychology, B. F. Skinner, has questioned the necessity for intervening variables and hypothetical constructs in explaining the phenomena of learning,[23] but most of his colleagues employ them in their theories. In administration, theory will be concerned with relationships between concepts that have empirical referents of varying degrees of unambiguity and with hypothetical constructs. For example, it is an oft-repeated theory in administration that the concentration of authority increases efficiency of operation. Here the concepts are "concentration," "authority," "increase," and "efficiency," rather than "teacher," "salary," "morale," etc. Obviously, "authority" and "efficiency" are liable to a high degree of ambiguity, and the credentials for the admission of empirical entities into these definitions are not so clearly specified as are "teacher" and "salary increments." Likewise, intervening variables created as concepts to increase our understanding of phenomena are often difficult to define. If we say "salary increments," a well defined concept, produce greater teacher "morale," a much less well defined concept and an intervening variable, we are stating a relationship between a well-defined concept of an empirical fact and an intervening variable. Or we may postulate another intervening variable between salary increments and behavior which we may use as an operational definition of morale such as "self-respect." If we assume that self-respect exists and that it explains how salary increments increase morale, we use it to explain a wide range of phenomena; but its existence is inferred because we have first wondered how salary increments could produce high morale. It is with the causal relationships between concepts ranging the whole continuum of abstraction that explanatory theory deals.

THEORY AND THE STUDY OF VALUES

Since educational administration is suffused with values, we may well ask how theory may be applied to the study of values—to what should be done or what is preferred as well as what can be done. The application of theory as definition to this aspect of educational administration is obvious; but explanatory theory has limitations here that it does not possess in the understanding of facts. It is immediately evident that the values that people hold may be determined by some sort of empirical study, aided by theory in the form of conjecture. Furthermore it is possible to use explanatory theory to understand why certain values are held in educational administration, e.g. the value of efficiency may have been derived from the field of economics where the good procedure is the efficient procedure. But to explain why efficiency is good, and not merely considered good, is an entirely different matter, although the two aspects are often confused. If we make the statement that the consolidation of schools up to a certain point is good up to a certain point because it provides for greater efficiency in operation, we are, in fact, making two statements, one a factual statement and the other a value judgment: consolidation of schools results in efficiency and efficiency is good. We may test the statement that consolidation results in efficiency, but we could never use the results to test whether efficiency is good. The value element in the original statement can be tested, not by the results of consolidation, but only by the value of those results. If, after consolidation, efficiency results, and efficiency is no longer considered good, then consolidation is no longer good.

[23]See his "Are Theories of Learning Necessary," *Psychological Review*, July, 1950, Vol. 57, pp. 193–216. To Skinner "theory" in learning apparently is restricted to the activity of postulating intervening variables.

The soundest theory can tell us what is or what is possible; it can never express a preference or an imperative.

Several types of theories have been analyzed to reveal their nature; but only incidentally have the functions that they perform been indicated. We may now turn to a brief discussion of what the theoretical study of administration may be expected to accomplish. As long as administration is concerned exclusively with the solution of practical problems, it will be restricted and hemmed in by the necessities that bring it into being. It will serve these demands, but it will have no control over them. Practice will continue endlessly at a level that is changed only as the problems themselves decree.

When theory as new dimension is added to administration, new ideas and concepts are deliberately sought, not only to explain and control immediate problems, but also to create new problems in order to extend the range of our power and understanding over problems that might never appear in routine practice.

The best, and most trite, example of what the theoretical study of a subject can do is found in science. While administration does not have the advanced and tremendously fruitful theories which modern science possesses, we should remember that the progress of science has been characterized by observation, conjecture, definition, classification, hypotheses concerning relationships, explanatory theories, and finally laws that enable us to acquire new facts that could not have been discovered by direct observation. In this paper, each of the above activities has been classified as a type of theory, an intellectual activity that has liberated the participant from the urgencies of immediate everyday problems long enough for him to gain some perspective on them. It is likely that administrators are going to theorize anyway and it is also likely that reflection, speculation, and intellectual manipulation will result in greater practical control. Since these things are so, so some systematic position should be made for theoretical study. Someone has defined administration as a series of routines, frequently interrupted by emergencies. Theory may help it to become a more deliberately ordered enterprise.

THE SCIENTIFIC METHOD

(Continued from page 239)

to stopper a flask containing boiling water and then to cool the flask. The recurrence of boiling in the flask provides the unexpected and a problem situation. Careful guidance by the instructor can turn the student's puzzlement to good advantage by placing the student in the role of a scientist who must set forth hypotheses from which testable consequences can be derived. As the student's experience in the laboratory advances, he should be confronted more and more with problematic situations which require not only careful experimentation but also a measure of theory construction. Such laboratory experiences should be supplemented with case studies of theory construction. Ernest R. Trattner's *Architects of Ideas*,[13] as well as other similar works, would prove helpful in this regard.

It is true, of course, that our potential scientist in upper division and graduate courses does come to realize the role of mathematics in the scientific method. He also learns exact techniques. He is a competent scientific observer and discoverer of facts, but throughout his school experiences he has had contact only incidentally,

[13]Ernest R. Trattner, *Architects of Ideas* (New York: Carrick and Evans, Inc., 1938).

(Continued on page 280)

METAPHYSICAL BASES OF CREATIVITY

BY ROBERT B. NORDBERG

IT IS MOST REFRESHING TO SEE PROFESSOR J. HERBERT BLACKHURST LOOK AT JOHN DEWEY'S PHILOSOPHY in a way that is both original and deep. I would judge Blackhurst's series of articles to be the most important philosophical development in education in the last five years. The purpose of the present "rejoinder" is to, as it were, discuss Dewey in terms of Blackhurst. While it is ordinarily questionable taste to write an article *about* an article, Dr. Blackhurst's contribution seems significant enough to provide grounds for an exception.

In the first place, it is encouraging to see "Dewey's metaphysical views"[1] referred to. Dewey was precisely a metaphysician. It was because he penetrated to the ontological problem, the question of being, that his ideas were able to branch out in so many directions at the operational level. This immediately involved him in a quandary, however, in that instrumentalism is, by its own accounting, against the whole proposition that metaphysical inquiries are relevant or valid. It has been fashionable among Dewey's followers to state that he took no metaphysical positions. Such an assertion is patently untrue, since his writings are liberally sprinkled with references to such topics as change, deity, universals, substance, etc. Dewey, like Freud and many others, loudly kicked metaphysics out the front door, only to quietly sneak his own metaphysical presuppositions in the back door.

DEWEY'S ONTOLOGICAL POSITION

What, then, was Dewey's ontological position? It was, as Blackhurst suggests, a philosophy of pure becoming—change without any subject. The pragmatist, according to Blackhurst, ". . . denies the existence of substance."[2] By 'substance' in this sense is meant that which, whether mental or corporeal, has any permanent aspect. Let us be absolutely clear about this. The distinction which Dewey was at pains to deny does not have to do with the *rates* of change, ranging from steel rail to a cloud. Rather, he denied that either the rail or the cloud has a fixed essence sufficiently broad in definition to account for the modifications it undergoes. For Dewey, a thing either is or is not (the 'thing', of course, being a process). There is no intermediate *possibility* of being. There is no distinction between the concrete flow of a thing, as characterized by Bergson and by modern physics, and *what* the thing is. Abstracting, as performed by the human intellect, is not abstracting at all as Aristotle understood the term (a grasping of universals) but merely a thinning-out process, a leaving-out of some details. Categories, therefore, are misleading. They are, at best, postulates to guide behavior, and to be judged by their consequences. (This of course, provides no way to judge the consequences, a point pragmatists are at great pains to overlook.)

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[1] J. Herbert Blackhurst, "Does the World-View of John Dewey Support Creative Education?," *Educational Theory*, Vol. V, October, 1955, p. 201.

[2] *Ibid.*, p. 196.

But was this "pure process," for Dewey, mental, material, or neither? Professor Blackhurst suggests that it was mental, which is probably true. Dewey, after all, was a serious student of Hegel, in whose system the universe is inseparable from finite conceptions of it. Therefore, no "problem of knowledge" arises for Dewey in the sense that would hold if he had regarded man as knowing a material world. The alternatives would appear to be an objective idealism such as that of Hegel, or solipsism. But Dewey steered between both. What of that which is not in anyone's consciousness at any given time? It is, Blackhurst says, a "waiting reality" for Dewey. The designation is thought-provoking, for it shows the inevitability, in any seriously considered system, of what Aristotelians call "potentiality," or capacity to be. What is a "waiting reality" waiting for? To be "real"? If so, it is not *now* a reality. But if it *is* now a reality, why does it need to wait? The answer—available to scholars since Aristotle, but by-passed in modern schools of thought—is that there are two modes of reality—existence and essence, or act and potentiality.

Blackhurst criticized Dewey somewhat as one member of a political party might criticize another. His differences with Dewey do not extend to a denial of the latter's view that there is no extra-organic truth. Speaking, by way of example, of trees as they exist independent of knowledge, Blackhurst says, "such objective trees cannot be known, for they are not of any person's experiential world."[3] This statement apparently assumes that knowing is a matter of some sort of concrete duplication in the mind of that which is known. There is an imaginative power by which the mind can synthesize its various sense-impressions of an object to get a "total picture," but this picture is only concerned with sense-qualities, not with interpretation. We know by abstractions. These abstractions do not involve merely a "thinning-out" of the concrete materials of the object, as the "general semanticists" imply, but an apprehension of form as distinct from matter. We can never, of course, perceive *all* of the traits and relationships of anything. Nevertheless, objective knowledge is possible, in that the ground of the universal is in the particular. We use abstractions; we know things.

Now Professor Blackhurst does not want matters to go in this realist direction. He says that, ". . . full realism if applied consistently to education would all but destroy everything creative about it."[4] A "vitalistic" philosophy—i.e., one that sees reality making itself as it goes along—is needed for such "creativity." Moreover, "What Hegel and Dewey failed to see is that vitalism must be a character of the human organism and not of cosmic universe."[5] To put it more simply, "creative education" presupposes that man's will is free.

HUMAN CREATIVITY AND DEWEY'S NEGLECT OF FORM

What does human creativity involve? This depends, of course, upon the relation in which man stands to the world. If he manufactures it by thinking it, then a philosophy of pure becoming, with the volition of the process centered in man, gives him the opportunity to think any kind of reality into being. But man does not stand in such a relationship to the world. Man exists in a cosmos that,

[3] *Ibid.*, p. 197.
[4] *Ibid.*, p. 200.
[5] *Ibid.*, p. 202.

as Blackhurst seems to partly agree, is independent of himself, essentially. He is confronted with substances to be known. He knows them by abstracting changeless universals from fluctuating particulars. The meanings which he thus abstracts cannot be mistaken. Nobody has yet provided an example of a mistaken meaning. Thus does error presuppose truth. Man can form mistaken *propositions* by predicating universals of the wrong subjects. The man who never saw a purple cow has seen all the elements he'd see if he *should* see one.

In what sense do we want man to be "creative"? The choice is between truth and error, although the former is admittedly very difficult to achieve. Creativity in the arts and sciences and in life rests finally upon a good knowledge of what is what. There are people who are informed but not creative, but nobody is creative and uninformed. In the last analysis, ". . . the truth shall make you free." An unpopular idea, this!

Therefore, I cannot agree with Professor Blackhurst as to the kind of philosophy we need in order to foster creativity. Rather, we need a realism in which man's role with respect to truth and value is to *discover* them, not to dream them up.

In the sort of "vitalism" that Blackhurst has in mind, man becomes (as in Sartre's existentialism) a sort of God-substitute. Divine creativity is not discussed. Perhaps there is a sense of immanent divinity, but not of transcendent divinity. By the same token, there is no room in such a system for the supernatural, since anything prior to concrete process is denied. A philosophy of pure becoming, whether cosmos-centered (Dewey) or man-centered (Blackhurst) likewise denies any definition or essential reality to human nature. As Professor Blackhurst points out, man is better off with a defined human nature under a loving Father than he is in a universe of pure process. The choice is not arbitrary, however. It is a matter of how things happen to be.

In short, Dewey's error was not—as Blackhurst suggests—in placing the springs of volition outside of man rather than inside him. It was, rather, seeing only one of two aspects of reality—its concrete, dynamic side. Dewey's eyes were closed to the other aspect of reality: form. Therefore, (a) he denied God, who is Pure Form, (b) he denied the possiblity of objective truth, which rests upon the apprehension of forms, (c) he denied the eternal essences of things, (d) he denied the legitimacy of logical universals, (e) he denied the reality of something called "human nature," and (f) he denied the soul (which Blackhurst without argument dismisses as "fiction," and which is the substantial form of the body). These half-dozen errors flow from a single metaphysical error. Since these errors have created a vast hierarchy of lesser errors in American education and society, it is hard to agree with those who say that metaphysics is unimportant.

Another approach might be to consider what sort of people are, in fact, creative. How much intellectual or aesthetic creativity has been produced by pragmatism? For every Dewey, there are a thousand parrots. If Blackhurst has succeeded in his series of articles in being creative, it is precisely because he went back to the metaphysical fountains whence Dewey drew his nourishment. One should visit these fountains often and drink deeply.

MATTHEW ARNOLD ON THE TEACHING OF SCIENCE

BY FRED G. WALCOTT

The Theory of Human Aptitudes as a Defense of Both Humane and Scientific Studies

ARNOLD'S CHIEF CRITICISM OF THE REVISED CODE OF 1862 was inspired by his larger view of what an acceptable popular education should comprehend. Scornfully he complained that to the penny-wise proponents of the Code, "the whole duty of a State in public education is to obtain the greatest possible quantity of reading, writing, and arithmetic for the greatest number. These are, so far as the State is concerned, the education of the people."[1] As a humanistic educator, Arnold was distressed by the prospect of such an attenuated offering. His concept of popular education encompassed the practical and the utilitarian as well as the literary studies. Accordingly, he stood among the first men of his century to defend the liberalizing power of the new and popular science. Human aptitudes, he said, incline men to one or the other of two roads to knowledge; few are born with the genius to travel both roads:

> The aim and office of instruction, say many people, is to make a man a good citizen, or a good Christian, or a gentleman; or it is to fit him to get on in the world, or it is to enable him to do his duty in that state of life to which he is called. It is none of these, and the modern spirit more and more discerns it to be none of these. These are at best secondary and indirect aims of instruction; its prime direct aim is to enable a man *to know himself and the world.* Such knowledge is the only sure basis for action, and this basis it is the true aim and office of instruction to supply. To know himself, a man must know the capabilities and performances of the human spirit; and the value of the humanities, of *Alterthumswissenschaft*, the science of antiquity, is, that it affords for this purpose an unsurpassed source of light and stimulus . . .
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> . . . But it is also a vital and formative knowledge to know the world, the laws which govern nature, and man as a part of nature. This the realists have perceived, and the truth of this perception, too, is inexpugnable. Every man is born with aptitudes which give him access to vital and formative knowledge by one of these roads; either by the road of studying man and his works, or by the road of studying nature and her works. The business of instruction is to seize and develope these aptitudes.[2]

When Arnold said these things, *The Origin of Species* had but recently been published. The year of its publication (1859) marked the first grant of funds by the State for supporting science instruction in special schools. In the same year the degree in science was instituted by the University of London. As a subject of instruction in the common schools, however, science existed, if at all, only as a trivial and rudimentary matter. Its entrance into the educational program had

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[1] "The Twice-Revised Code," *Fraser's Magazine*, Vol. LXV, March, 1862, p. 348.
[2] *Schools and Universities on the Continent* (London, 1868), pp. 258–259.

been by the back way. It had been accorded no part in liberal education for the simple reason that it had not been recognized as liberal. When with the rise of colleges or "institutes" for mechanics, science had found its place, the new inclusion had been completely overlooked by the Tory opponents of lower-class education, because they had failed utterly to recognize its liberal character; they saw in science only a gross, plebeian, function which they were quite willing to relegate to the "institutes."[3] Arnold's recognition of this great cultural discipline at the moment of its first impact upon traditional thought, serves as an index of his professional foresight.

According to his theory of aptitudes, Arnold recognized more than one entrance into the circle of knowledge; and the human seeker after culture would best succeed, he believed, by following his own peculiar bent. The circle was too vast, and the power of the human faculties too limited, to permit any other practical induction. Meanwhile, he thought, neither the humanists nor the realists were capable, from an extreme and isolated position, of conceiving the full circle. His proof lay in the readiness of each faction to belittle that part of the field which it could not comprehend. The humanists insisted that man's access to the realm of vital knowledge was "by knowing himself,—the poetry, philosophy, history which his spirit has created;" the realists looked rather to the sciences, to the facts and the laws of nature.[4]

Arnold considered neither extreme position tenable. In fact, it was only when forced to choose between the claims of one faction or the other that he would express a preference for the humanistic studies:

> But it seems to me that so long as the realists persist in cutting in two the circle of knowledge, so long do they leave for practical purposes the better portion to their rivals, and in the government of human affairs their rivals will beat them. And for this reason. The study of letters is the study of the operation of human force, of human freedom and activity; the study of nature is the study of the operation of non-human forces, of human limitation and passivity. The contemplation of human force and activity tends naturally to heighten our own force and activity; the contemplation of human limits and passivity tends rather to check it.[5]

The statement is purely polemical, but it squares well with Arnold's fundamental belief. His humanism was broad and inclusive: he defended the liberalizing power of science; but if driven to choose between science and letters, he would declare an outright preference for the latter.

"LITERATURE AND SCIENCE"—THE REAL GROUNDS OF THE HUXLEY-ARNOLD CONTROVERSY

An understanding of Arnold's position is important in any approach to his relationship with Thomas Henry Huxley. As the champion of science, Huxley also maintained a reasonable, never an extreme, position. The inferior status of the subject, according to popular judgment, required improvement, and it was Huxley who most eminently defended its cultural values. Science had come into the educational program as an associate of the arts and crafts, and in complete

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[3]Richard Laurence Archer, *Secondary Education in the Nineteenth Century* (Cambridge, 1928), p. 100.

[4]*Schools and Universities on the Continent*, p. 259.

[5]*Ibid.*, p. 260.

isolation from the respectable humanities. The Science and Art Department, organized to supervise the distribution of the South Kensington grants,[6] continued as a separate institution until 1899. From 1871 to 1875 the Royal Commission on Scientific Instruction, known as the Devonshire Commission, presented a series of recommendations concerning the content of science instruction throughout the grades, and in 1872 Huxley reorganized the South Kensington "Schools of Science," and wrote the curriculum therefor. Systematic and practical as his efforts may have been, it is clear that too few teachers were available with knowledge and vision enough to bring his projects to fruition. "Nowhere," says Archer, "was the insidious system of payment by results worked out so elaborately, and nowhere was education so completely replaced by 'cramming.'"[7] Huxley therefore serves as another of those multitudinous examples of the reformer who cannot bridge the gulf between a genuine cultural idealism and the vicissitudes of practical administration. His exposition of the cultural potentialities of practical science stands, nevertheless, as one of the great landmarks both of science and of letters.[8]

Arnold and Huxley, both possessed of the same idealism, surveyed the selfsame cultural problem from opposite sides—each from his own vantage point, it is true, but each in a manner resembling the other's. Between the respective views of the two men, there is a considerable basis of agreement. Even as Arnold was writing his own polemical defense of classical culture, Huxley was proclaiming substantially the same beliefs. Speaking before the South London Working Men's College in 1868, Huxley thus expressed his own concern for the classical studies:

> Now, do not expect me to depreciate the earnest and enlightened pursuit of classical learning. I have not the least desire to speak ill of such occupations, nor any sympathy with those who run them down. On the contrary, if my opportunities had lain in that direction, there is no investigation into which I could have thrown myself with greater delight than that of antiquity.
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> What science can present greater attractions than philology? How can a lover of literary excellence fail to rejoice in the ancient masterpieces? And with what consistency could I, whose business lies so much in the attempt to decipher the past, and to build up intelligible forms out of the scattered fragments of long-extinct beings, fail to take a sympathetic, though an unlearned, interest in the labours of a Niebuhr, a Gibbon, or a Grote? Classical history is a great section of the palaeontology of man; and I have the same double respect for it as for other kinds of palaeontology—that is to say, a respect for the facts which it establishes as for all facts, and a still greater respect for it as a preparation for the discovery of a law of progress.[9]

This might well be Arnold speaking, so strong is the affinity between the educational theories of the two men. Huxley is here speaking of classical learning, of the study of the ancient languages as practiced in all the public schools and universities of the land. It was, however, a study heavily encumbered with philological formalities and endless exercises in prosody—the production by

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[6]The grants by the State for instruction in science were called South Kensington grants, and the special schools thus supported were called South Kensington schools.

[7]Archer, *op. cit.*, p. 140.

[8]See particularly "On the Advisableness of Improving Natural Knowledge," *Methods and Results* (New York, 1896), pp. 18–41.

[9]"A Liberal Education; and Where to Find It," *Collected Essays* (New York, 1897), Vol. III, pp. 97–98.

uncomprehending students of "lame longs and shorts." Both men knew this, and both protested vigorously against the current sterile methods; both looked yearningly beyond this dull "philological vestibule" to the higher cultural possibilities, to the great humanizing function which *should be*, but seldom *was*, realized. Huxley proceeds to voice his protest in the very next paragraph after the one quoted *supra*:

> But if the classics were taught as they might be taught—if boys and girls were instructed in Greek and Latin, not merely as languages, but as illustrations of philological science; if a vivid picture of life on the shores of the Mediterranean two thousand years ago were imprinted on the minds of scholars; if ancient history were taught, not as a weary series of feuds and fights, but traced to its causes in such men placed under such conditions; if, lastly, the study of the classical books were followed in such a manner as to impress boys with their beauties, and with the grand simplicity of their statement of the everlasting problems of human life, instead of with their verbal and grammatical peculiarities; I still think that it is as little proper that they should form the basis of a liberal education for our contemporaries, as I should think it fitting to make that sort of palaeontology with which I am familiar the backbone of modern education.[10]

The basic and concluding assertion in this passage represents an important qualification, one that it is necessary to comprehend fully; its key lies in the word *basis*. Highly as Huxley regarded the values of classical studies, he believed that even if they were taught as they should be taught, it was still "little proper that they should form the *basis* of a liberal education for our contemporaries." The fund of contemporary knowledge was too vast, too significant, too immediate to the needs of modern life to be thus supplanted and eclipsed by a narrow, by an ancient culture. His quarrel, however, was only with those humanists who "take their stand upon classical education as the sole avenue to culture." He would by no means exclude the humanizing function of literature, even from the curriculum of the science "institutes," but he would rely upon more modern examples:

> Instruction in English, French, and German is provided, and thus the three greatest literatures of the modern world are made accessible to the student.
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> French and German, and especially the latter language, are absolutely indispensable to those who desire full knowledge in any department of science. But even supposing that the knowledge of these languages acquired is not more than sufficient for purely scientific purposes, every Englishman has, in his native tongue, an almost perfect instrument of literary expression; and, in his own literature, models of every kind of literary excellence. If an Englishman cannot get literary culture out of his Bible, his Shakespeare, his Milton, neither, in my belief, will the profoundest study of Homer and Sophocles, Virgil and Horace, give it to him.[11]

It was here, within the narrow limits of this simple qualification, that the so-called controversy between Arnold and Huxley arose; and even here, within this limit, the opinions of the two men are remarkable in their essential agreement. Arnold's feeling for Huxley was one of genuine deference and admiration. Writing to his sister "K" in 1884, he said of the great lecturer: "He is very ill, and looks like a man quite spent. I have a real affection for him though we seldom meet; it brought the tears into my eyes to see him. But I should think he would

[10] *Ibid.*, p. 98.

[11] "Science and Culture," *Collected Essays* (New York, 1897), Vol. III, p. 154.

have great rallying power, when he gets real rest."[12] A charming passage from the Preface to *St. Paul and Protestantism* reflects Arnold's eagerness to intercede for Huxley when attacked by religious zealots:

> Give the churches of Nonconformity free scope, cries an ardent Congregationalist, and we will renew the wonders of the first times; we will confront this modern bugbear of physical science, show how hollow she is, and how she contradicts herself! In his mind's eye, this Nonconforming enthusiast already sees Professor Huxley in a white sheet, brought up at the Surrey Tabernacle between two deacons—whom that great physicist, in his own clear and nervous language, would no doubt describe like his disinterred Roman the other day at Westminster Abbey, as "of weak mental organization and strong muscular frame,"—and penitently confessing that *Science contradicts herself*.[13]

There was much that was congenial between the two men: both were faithful exponents of the same true culture; both yearned steadfastly toward the same bright cynosure.

The public correspondence between the two began with Huxley's lecture before Sir Josiah Mason's College at Birmingham (1880)—that is, with his "Science and Culture" quoted *supra*. In this lecture he referred pleasantly to Arnold's assertion that literature contains the materials which suffice for thus making us know ourselves and the world:

> Mr. Arnold tells us that the meaning of culture is "to know the best that has been thought and said in the world." It is the criticism of life contained in literature. That criticism regards "Europe as being, for intellectual and spiritual purposes, one great confederation, bound to a joint action and working to a common result; and whose members have, for their common outfit, a knowledge of Greek, Roman, and Eastern antiquity, and of one another. Special, local, and temporary advantages being put out of account, that modern nation will in the intellectual and spiritual sphere make most progress, which most thoroughly carries out this programme . . ."[14]

Huxley saw in Arnold's statement two distinct propositions: one, that a criticism of life is the essence of culture; two, that literature furnishes the essential elements of such a criticism. To the first proposition, Huxley gave full assent; the second, he insisted, required some qualification. Literature, he believed, does lend largely to an ample criticism of life, but to rely upon this medium as the sole basis of such a criticism will produce a pattern that is incomplete. So vast, so revolutionary have been the impacts of science upon the modern world, that the facts and attitudes to be derived from this discipline must also constitute an integral part of any adequate cultural understanding, either of one's self or of the universe. "Considering progress only in the 'intellectual and spiritual sphere,'" said Huxley, "I find myself wholly unable to admit that either nations or individuals will really advance, if their common outfit draws nothing from the stores of physical science. "I should say," he added, "that an army, without weapons of precision and with no particular base of operations, might more hopefully enter upon a campaign on the Rhine, than a man, devoid of a knowledge of what physical science has done in the last century, upon a criticism of life."[15]

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[12] Arnold Whitridge, *Unpublished Letters of Matthew Arnold* (New Haven, 1923), p. 54.

[13] *Loc. cit.* (New York, 1883), pp. xxxv–xxxvi. See also *Culture and Anarchy* (*ed. cit.*), p. 24, for another example of Arnold's intellectual affinity with Huxley.

[14] *Loc. cit.*, pp. 142–143. Huxley is here quoting Arnold's "The Function of Criticism at the Present Time," *Essays in Criticism*, First Series (London, 1910), p. 39.

[15] "Science and Culture," *ed. cit.*, p. 144. Arnold had himself made practically the same qualification (*cp.* footnote 1).

Arnold's reply was certainly a masterpiece of restrained and temperate exposition. He protested, of course, that Huxley had fallen into the common error of limiting his (Arnold's) concept of literature to the narrow study of *belles lettres*. He himself had a much broader, a more sustaining theory of the humanities than this:

> But when we talk of knowing Greek and Roman antiquity, for instance, which is the knowledge people have called the humanities, I for my part mean a knowledge which is something more than a superficial humanism, mainly decorative. 'I call all teaching *scientific*,' says Wolf, the critic of Homer, 'which is systematically laid out and followed up to its original sources. For example: a knowledge of classical antiquity is scientific when the remains of classical antiquity are correctly studied in the original languages.' There can be no doubt that Wolf is perfectly right; that all learning is scientific which is systematically laid out and followed up to its original sources, and that a genuine humanism is scientific.
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> When I speak of knowing Greek and Roman antiquity, therefore, as a help to knowing ourselves and the world, I mean more than a knowledge of so much vocabulary, so much grammar, so many portions of authors in the Greek and Latin languages. I mean knowing the Greeks and Romans, and their life and genius, and what they were and did in the world; what we get from them, and what is its value. That, at least, is the ideal; and when we talk of endeavouring to know Greek and Roman antiquity, as a help to knowing ourselves and the world, we mean endeavouring so to know them as to satisfy this ideal, however much we may still fall short of it.[16]

Like Huxley, Arnold conceived of the humanities as a great synthesis, comprehending all knowledge, including science.[17] Huxley had expounded the liberalizing impact of natural science upon the spirit of man; Arnold must include science within the beneficent offices of literature; each cautions the other against circumscribing unduly the comprehensive limits of the cultural field. It was the narrow concept of humanism against which Huxley was protesting; he repudiated only "the learned specialists," who, he maintained, "possess no such sound foundation for a criticism of life as deserves the name of culture." The Renaissance, he insisted, was not wholly a revival of ancient letters, but also a revival of science. It was in their failure to comprehend this important fact that the "learned specialists" had brought reproach upon themselves; these men had failed, he said, to comprehend the "full spirit of the ancient Greek"; they had failed even in comprehending the dual aspects of the Renaissance:

> In fact, the few and scattered students of nature of that day [the Renaissance] picked up the clue to her secrets exactly as it fell from the hands of the Greeks a thousand years before. The foundations of mathematics were so well laid by them, that our children learn their geometry from a book written for the schools of Alexandria two thousand years ago. Modern astronomy is the natural continuation and development of the work of Hipparchus and of Ptolemy; modern physics of that of Democritus and of Archimedes; it was long before modern biological science outgrew the knowledge bequeathed to us by Aristotle, by Theophrastus, and by Galen.
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> We cannot know all the best thoughts and sayings of the Greeks unless we know what they thought about natural phenomena. We cannot fully apprehend their

[16] "Literature and Science," *Discourses in America* (London, 1885), pp. 87–89. This essay was originally the Rede Lecture, given at Cambridge University, and published first in *The Nineteenth Century*, Vol. XII, No. 66 (August, 1882), pp. 216–230.

[17] *Cp.* the passage quoted *supra*, footnote 9, from "A Liberal Education; and Where to Find It." The difference in the two points-of-view is purely one of emphasis.

> criticism of life unless we understand the extent to which that criticism was affected by scientific conceptions. We falsely pretend to be the inheritors of their culture, unless we are penetrated, as the best minds among them were, with an unhesitating faith that the free employment of reason, in accordance with scientific method, is the sole method of reaching truth.[18]

Huxley was demonstrating, in fact, that even the modern scientist must build upon the old foundation as recorded in the classical authors. He insisted only that the "criticism of life" to be obtained from those authors must be incomplete so long as it failed to comprehend what had been a considerable portion of their knowledge—that is, the scientific concepts which they had held. Arnold was quick to follow this extraordinary lead. Said Arnold:

> But as I do not mean, by knowing ancient Rome, knowing merely more or less of Latin *belles lettres*, and taking no account of Rome's military, and political, and legal, and administrative work in the world; and as, by knowing ancient Greece, I understand knowing her as the giver of Greek art, and the guide to a free and right use of reason and to scientific method, and the founder of our mathematics and physics and astronomy and biology,—I understand knowing her as all this, and not merely knowing certain Greek poems, and histories, and treatises, and speeches,—so as to the knowledge of modern nations also. By knowing modern nations, I mean not merely knowing their *belles lettres*, but knowing also what has been done by such men as Copernicus, Galileo, Newton, Darwin.[19]

Arnold has taken his words from Huxley's own mouth and rendered his own thought back to him. Huxley had protested against a narrow concept of humanism, one that excluded science; Arnold merely emphasized his own agreement. If Huxley had misapprehended Arnold's ideas of culture and ascribed to him a narrow instead of a broad concept, he (Arnold) had only to correct that misapprehension to bring the two into harmony. And so without repudiating his opponent in any mean way, Arnold thus maintains an equitable defense:

> Let us therefore, all of us, avoid indeed as much as possible any invidious comparison between the merits of humane letters, as means of education, and the merits of the natural sciences. But when some President of a Section for Mechanical Science insists on making the comparison, and tells us that 'he who in his training has substituted literature and history for natural science has chosen the less useful alternative,' let us make answer to him that the student of humane letters only, will, at least, know also the great general conceptions brought in by modern physical science; for science, as Professor Huxley says, forces them upon us all. But the student of the natural sciences only, will, by our very hypothesis, know nothing of humane letters; not to mention that in setting himself to be perpetually accumulating natural knowledge, he sets himself to do what only specialists have in general the gift for doing genially. And so he will probably be unsatisfied, or at any rate incomplete, and even more incomplete than the student of humane letters only.[20]

The controversy thus concluded exemplifies the intellectual affinity between the two men; but more important still, it reveals the intellectual modernity that characterized the two great thinkers, a breadth of cultural vision that renders their kindred judgments valid and contemporary.

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[18] "Science and Culture," *loc. cit.*, Vol. III, pp. 151–152.
[19] "Literature and Science," *loc. cit.*, pp. 91–92.
[20] *Ibid.*, pp. 125–126.

ARNOLD AS AN EXPONENT OF THE SCIENTIFIC METHOD

The impregnation of the humanist's mind with "the great general conceptions brought in by modern physical science" was an actuality with Arnold himself. Not only did he reveal his familiarity with the great figures of science and their general theses, but he displayed at least an amateur's respect for research and the scientific method. It is true that his own use of scientific methods may have sometimes fallen short, for he employed them usually in polemical matters, such as theories of religious faith, where experiment is impracticable. He speculated scientifically, a different thing from using scientific methods. An example may be found in his *On the Study of Celtic Literature* (1867). Here he became engrossed by the work of the modern ethnologists in their study of the natural relationships between racial groups: "the doctrine of a great Indo-European unity, comprising Hindoos, Persians, Greeks, Latins, Celts, Teutons, Slavonians, on the one hand, and, on the other hand, of a Semitic unity and of a Mongolian unity, separated by profound distinguishing marks from the Indo-European unity and from one another, . . ."[21] He speculated with some zest on the harmonic affinities which members of the same unity might naturally detect in one another, despite long geographic and cultural isolation. In this new scientific whimsy, he thought he saw a means, perhaps, of gratifying the wishful dream of many an Englishman, a hope and a justification for assimilating the incorrigible Celt through the discovery of a common strain of temperament, a potential compatibility as yet unrecognized, instead of a genuine ethnic antipathy. And all this was to be had through the simple ministration of scientific research.

> This tendency [to recognize racial affinities] is now quite visible even among ourselves, and even, as I have said, within the great sphere of the Semitic genius, the sphere of religion; and for its justification this tendency appeals to science, the science of origins; it appeals to this science as teaching us which way our natural affinities and repulsions lie. It appeals to this science, and in part it comes from it; it is, in considerable part, an indirect practical result from it.[22]

If such speculation appears somewhat tenuous, Arnold had at least learned from the scientists a very serviceable device, a clear setting of one's inferential limits and a careful guarding of one's retreat. Hence it is not surprising to hear him say later,

> However, it is not my intention, in these remarks, to lay it down for certain that this or that part of our powers, shortcomings, and behaviour, is due to a Celtic, German, or Norman element in us. To establish this I should need much wider limits, and a knowledge, too, far beyond what I possess; all I purpose is to point out certain correspondences, not yet, perhaps, sufficiently observed and attended to, which seem to lead towards certain conclusions. The following up the inquiry till full proof is reached,—or perhaps, full disproof,—is what I want to suggest to more competent persons.[23]

The important point is that Arnold exemplified his own claim: he, a humanist, had encountered the ethnological and philological ideas of his time and had absorbed them with zest and delectation. He had, furthermore, some sense of the scientific method, enough at least to prompt him to caution in his own statements.

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[21] *Idem.* (New York, 1883), p. 15.
[22] *Ibid.*, pp. 16–17.
[23] *Ibid.*, p. 91.

Even in religious matters, Arnold sought to maintain and to apply a scientific method. The professional scientist may smile at the thought, but there are many who will recognize something substantial and impressive in Arnold's systematic thinking. Remembering the vituperations hurled at science by the zealots even of the present day, they will find refreshment in Arnold's forthright manner:

> And first let us premise what we mean in this matter by primary and secondary, essential and subordinate. We mean, so far as the apostle is concerned, a greater or less approach to what really characterises him and gives his teaching its originality and power. We mean, so far as truth is concerned, a greater or less agreement with facts which can be verified, and a greater or less power of explaning them. What essentially characterises a religious teacher, and gives him his permanent worth and vitality, is, after all, just the scientific value of his teaching, its correspondence with important facts, and the light it throws on them. Never was the truth of this so evident as now. The scientific sense in man never asserted its claim so strongly; the propensity of religion to neglect those claims, and the peril and loss to it from neglecting them, never were so manifest. The license of affirmation about God and his proceedings, in which the religious world indulge, is more and more met by the demand for verification . . . It is true, when the scientific sense in us, the sense which seeks exact knowledge, calls for that verification, Calvinism refers us to St. Paul, from whom it professes to have got this history of what it calls "the covenant of redemption." But this is only pushing the difficulty a stage further back. For if it is St. Paul, and not Calvinism, that professes this exact acquaintance with God and his doings, the scientific sense calls upon St. Paul to produce the facts by which he verifies what he says; and if he cannot produce them, then it treats both St. Paul's assertion, and Calvinism's assertion after him, as of no real consequence.[24]

It would be irrelevant to trace further Arnold's handling of the St. Paul thesis, and to examine whether or not he (Arnold) meets the test of scientific method. The important point is that here was a writer of the 19th Century cogently considering the methods of science and deliberately proposing to apply them as a test of the soundness of religious doctrine, doing this at the moment when the votaries of formalized religion were venting their maledictions upon the new agnostics who would set facts and the observations of nature above the authority of established creeds.[25] Arnold was by nature a devout and reverent man. The fact that he could accommodate the most advanced ideas of his day, even become their fearless advocate, clearly marks his imposing intellectual stature and places him as completely abreast of the prophetic tendencies of his time.

ARNOLD'S IDEAS ON SCIENCE AS A CURRICULAR INCLUSION

But with Arnold the educator, we should expect to gauge the importance he would attach to science largely by the place he would accord to it in the curriculum. Perspective is all-important in examining his comments; it must never be forgotten that in dealing with science he is concerned with what stands in the popular mind as an innovation, with what would today be placed by a large portion of the critical public in the category of "fads and frills."

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[24] *St. Paul and Protestantism* (New York, 1883), pp. 6–7.

[25] The importance which Arnold attributed to his religio-scientific theme may be gauged by the long interval of his preoccupation with it. For eight years he devoted himself assiduously to the exposition of it, an effort that resulted in the publication of four major works: *St. Paul and Protestantism* (1870), *Literature and Dogma* (1873), *God and the Bible* (1875), and *Last Essays on Church and Religion* (1877).

Notwithstanding the high place that Arnold would accord to literature and the humanities—themselves "fads and frills" in the elementary and secondary schools of his day—he would, nevertheless, reserve an honored place for science. In fact, in his comparison of the British secondary schools with those of the Continent, it was the inferior development of the instruction in science that most characterized the disadvantages of the former; and when comparing instruction in science with that of the humanities in the British schools, it was the ineffectuality of the teaching of science that most accentuated the inferior status of this subject in the popular mind:

> . . . we may willingly declare with the Italians that no part of the circle of knowledge is common or unclean, none is to be cried up at the expense of another. To say that the fruit of classics, in the boys who study them, is at present greater than the fruit of the natural sciences, to say that the realists have not got their matters of instruction so well adapted to teaching purposes as the humanists have got theirs, comes really to no more than this: that the realists are but newly admitted labourers in the field of practical instruction, and that while the leading humanists, the Wolfs and the Buttmanns, have been also schoolmasters, and have brought their mind and energy to bear upon the school-teaching of their own studies, the leaders in the natural sciences, the Davys and the Faradays, have not. When scientific physics have as recognised a place in public instruction as Latin and Greek, they will be as well taught.[26]

It is for the rising middle class that science, according to Arnold's judgment, stands as the great paramount need. This great middle class, thwarted and deprived of its social rights through the indifference of the superior classes and its own ignorant complicity, brought up on the second plane, insufferably and arrogantly proud of its own inanities—if only it might have science as a compensating benefit:

> If only, in compensation, it had science, systematic knowledge! The stronghold of science should naturally be in a nation's middle class, who have neither luxury nor bodily toil to bar them from it. But here comes in the intellectual inconvenience of the bad condition of the mass of our secondary schools . . . Short as the offspring of our public schools and universities come of the idea of science and systematic knowledge, the offspring of our middle class academies probably come, if that be possible, even shorter. What these academies fail to give in social and governing qualities, they do not make up for in intellectual power.[27]

In thus prescribing for the needs of the middle class, Arnold meant to advocate no educational stratification; he implied no acceptance of the common illusory judgment of his time concerning the inferior place of science in the scale of intellectual respectability. It is undoubtedly true that he spoke from an awareness of its utilitarian, as well as of its cultural, values. The facts are, however, that despite any reservations that he might have had in comparing science with *Alterthumswissenschaft* as a cultural agent, he was still a strong advocate of science as an addition to the secondary curriculum of his time—and this because of his own temperamental inclinations.

Arnold's active interest in science extended also to his recommendations for the elementary schools. In his Report to the Committee of Council for the year 1876, he again discussed the relative importance of literature and science as branches of the elementary curriculum. Here, however, his solicitude for the humanities

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[26] *Schools and Universities on the Continent*, pp. 260–261.
[27] *Ibid.*, p. 277.

had been newly quickened by the recent exertions of the special advocates of science; in fact, one will recognize in this report one of the sources of Arnold's reply to Huxley's lecture before Sir Josiah Mason's College.[28] In his perturbation he pleaded here for the humanizing, moralizing functions of literature, as the catalyzing agent whereby the utilitarian values of science might be realized:

> To have the power of using, which is the thing wished, these data of natural science, a man must, in general, have first been in some measure *moralised*; and for moralising him it will be found not easy, I think, to dispense with those old agents, letters, poetry, religion. So let not our teachers be led to imagine, whatever they may hear and see of the call for natural science, that their literary cultivation is unimportant. The fruitful use of natural science itself depends, in a very great degree, on having effected in the whole man, by means of letters, a rise in what the political economists call *the standard of life*.[29]

One must not be misled by this earlier predisposition to acclaim the humanities; it reflects no dilatory indecision. Even here Arnold implied no disparagement of the sciences. In his next Report, for the year 1878, he became much more constructive, more specific, in his comments upon the science that was being offered in the elementary schools:

> In my last report[30] I proposed that what the Germans call *Natur-kunde*—some knowledge of the facts and laws of nature—should be taught as a class-subject[31] in addition to grammar, geography, and English history. This has been treated as a proposal to amplify our present programme; it was really a proposal to simplify it. *Natur-kunde*—an elementary knowledge of nature—was to be admitted, but its admission was to be accompanied by a revision of our ambitious fourth schedule, and by the exclusion from it of mathematics, German, mechanics, animal physiology, physical geography, and botany . . . The excuse for putting most of these matters into our programme is that we are all coming to be agreed that an entire ignorance of the system of nature is as gross a defect in our children's education as not to know that there ever was such a person as Charles the First. Now our ordinary class-programme provides, or at any rate suggests, some remedy against the second kind of ignorance, for history is one of our class-subjects;[32] it provides none against the first. This is a blot; we ought surely to provide that some knowledge of the system of nature should form part of the regular class course. Some fragments of such knowledge do in practice form part of the class course at present. Children in learning geography are taught something about the form and motion of the earth, about the causes of night and day and the seasons. But why are they taught nothing of the causes, for instance, of rain and dew, which are at least as easy to explain to them, and not less interesting? And this is what the teaching of *Natur-kunde* or natural philosophy (to use the formerly

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[28] Huxley's "Science and Culture." Huxley's lecture, of course, was given four years later; and this proves that Arnold's thoughts on the subject clearly antedated this controversial incident; they had, in fact, been categorically stated twelve years earlier, in 1868 (cf. *Higher Schools and Universities in Germany*, London, 1892, pp. 162 ff.).

[29] *Reports on Elementary Schools*, p. 200.

[30] For 1876, quoted *supra*.

[31] By 1867, the desiccating effects of the Revised Code in drawing all instructional attention to the grant-earning tools—reading, writing, and ciphering—had become apparent to the most uncritical observers. In that year, therefore, the Committee of Council issued a Minute instituting an additional grant, dependent, among other conditions, upon the inclusion of "one or more specific subjects of secular instruction."

[32] The Code of 1867 required the offering of only "one or more specific subjects of secular instruction" and did not prescribe what these should be. The inclusion, then, of any one subject would be purely elective.

(*Continued on page 268*)

JOHN DEWEY: AMERICAN PHILOSOPHER AND EDUCATOR*

BY GEORGE DYKHUIZEN

JOHN DEWEY IS GENERALLY REGARDED AS THE PHILOSOPHER WHO MOST ACCURATELY EXPRESSES THE THOUGHTS AND ASPIRATIONS OF THE AMERICAN PEOPLE. One of his biographers remarks: "Dewey's writings have brought to reflective expression some of the most distinctive idioms of American faith and practice—its democratic traditions, its concern with methods and consequences, its sense of possibilities that are still open to courageous and disciplined intelligence . . . There is hardly a phase of American thought to which he had not made some contribution, hardly an aspect of American life which he has left uninterpreted. His influence has extended to the schools, the courts, the laboratories, the labor movement, and the politics of the nation."

Dewey was born in Burlington, Vermont, in 1859. He was educated in the public schools of Burlington, and, when sixteen years old, entered the University of Vermont. Upon being graduated, he taught high school for three years, and then entered the newly founded Johns Hopkins University as a graduate student in philosophy. He received his Ph.D. degree from there in 1884, and within ten years became professor of philosophy and education at the University of Chicago. While at Chicago, he established his famous experimental school as a laboratory for his new ideas in education. He was appointed professor of philosophy at Columbia University in 1904, and continued in this post until his retirement in the 1930's. Dewey died on June 1, 1952.

Those who knew Dewey personally were captivated by his simplicity, sincerity, and inherent kindness. He recoiled from cruelty and injustice of every sort, and his moral courage was such that he never hesitated to lend his name and influence to causes which he judged morally right and socially desirable. There was no pretense about Dewey. Much of his charm consisted in his completely natural reactions to people and situations. The honors which were accorded him during his lifetime and the high repute in which he was universally held did not take away from his innate modesty. Deeply aware of his own shortcomings, he remained humble in spirit, and was to the end of his days the genuine philosopher forever in search of truth and wisdom.

Dewey's Theory of Knowledge and Empirical Metaphysics

Among the influences on Dewey's thought was the Hegelianism which constituted so powerful a factor in the intellectual life of the nineteenth century. Hegel taught that reality is a process in which the Absolute advances toward its goals. Human striving, including man's quest for truth, is part of this process. Dewey accepts the notion that reality is in constant flux and that human truth

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grows and changes as human experience expands. However, Hegel's doctrine that truth progresses to a final, absolute stage such as already exists in the mind of the Absolute is eventually discarded by Dewey since he comes to the conviction that such a truth never really operates in human experience and is therefore quite meaningless. Dewey was also deeply impressed by Hegel's further doctrine that reality is continuous and organically one. Dewey tells us that he was troubled by the sharp dualisms which characterized many of the more influential philosophies of his day; such dualisms as: the natural versus the supernatural, mind versus body, appearance versus reality, reason versus opinion, and others. He says that he found in Hegel ideas which helped him later to overcome these dualisms.

A second influence was Darwinian biology. Whereas many philosophers orient their thinking around mathematics and mathematical physics, Dewey orients his philosophy around evolutionary biology. Some of the basic categories of his thinking—organism, environment, growth, adjustment, instruments of adaptation—are derived from biology. Indeed, Dewey's philosophy may be viewed as an attempt to work out systematically and fully the implications of the evolutionary doctrine that man is not only a part of nature but a product of it.

William James helped Dewey to see mind in an evolutionary context. James's *Principles of Psychology*, written in 1890, argued that there is no ready-made mind, intelligence, or consciousness conceived as a stuff. Rather, mind evolves gradually as the slow cumulative effect of certain kinds of interactions between organisms and their environment. Intelligence is a distinctive kind of physical behavior, and arises as the organism attempts to solve the problems which constantly confront it.

It was Charles Sanders Peirce who persuaded Dewey that the only effective way to explain the meaning of an idea is to appeal to its consequences. In a famous article, "How To Make Our Ideas Clear," Peirce contends that an idea has meaning only in terms of the consequences which it intends. In defending this doctrine, Peirce lays the foundation for pragmatism. It remained for Dewey to give pragmatism its most systematic and convincing statement.

An account of Dewey's doctrines can well begin with his theory of knowledge and ideas, since an understanding of this aspect of his thought supplies insights helpful to a grasp of the other phases of his philosophy. Dewey's point of departure is a criticism of what he calls the "spectator" theory of knowledge. This view holds that the mind is mostly a passive spectator confronted by a world which is waiting to be known, and it conceives ideal truth to be an absolute system of ideas which portrays the universe as it really is. The problems which this theory must solve are how to account for the mind and the world getting together so as to create knowledge, and how to determine the degree of absolute truth in the knowledge which we at any time possess.

Dewey believes that the spectator theory of knowledge sets up a situation which is artificial and unreal and that the problems with which it has been traditionally struggling are pseudo-problems. He argues that the living organism from the very first is in interaction with its environment and that there is no problem of getting them together. "Knowing" is an aspect of that interaction just as breathing and walking are. Reflection, ideas, intelligence evolve as the result of the organism's attempts to overcome the difficulties which arise in the

course of its experience. Ideas are plans of action; they are instruments by which the human organism tries to solve specific problems at specific times and places. Ideas are not revelations of an antecedent reality which exists prior to the knowing act, nor does their truth consist in their correspondence to such a reality. True ideas, Dewey teaches, are those which overcome difficulties, and enable experience to go on unimpeded and unperplexed. The test to be put to any idea is to apply it to experience and see how it functions. If it solves the problem and brings about the results which it promised, it should be accepted as true. Truth, however, is not a private affair serving every whim or desire of human nature. Rather, it is that which commends itself to all competent and unbiased observers, as in science. Science maintains that it is not enough that a hypothesis or theory satisfy the demands of an individual investigator; it must at the same time meet the demands of the community of scientists and be verified in their experience.

Scientific procedure in the discovery, testing and acceptance of ideas is the procedure which Dewey advocates for all fields of human inquiry. Dewey has an almost religious devotion to modern scientific method, and one of the recurrent notes in his philosophy is the superiority of the method of science over all other methods in the acquiring of truths. Dewey points to the achievements of science in those fields where it has been allowed to operate as witness to this superiority. He is convinced that one of the great needs of today is to do in the field of human relations and human value what was done a century or two ago in the field of physical and biological science, namely, to employ the scientific approach to the problems and difficulties prevailing in these areas of human experience.

The argument of Dewey's theory of knowledge adds up to this: Intelligence and ideas did not arise in the course of human evolution to enable the human organism to acquire a true picture of some ultimately real universe. They came into existence in response to the organism's need to solve specific problems in specific situations. Ideas are instruments and not revelations. Dewey's theory bids men to renounce the vain hope that their ideas give truth about some antecedent reality and to rest content with the claim that ideas are plans of action designed to overcome particular difficulties.

Metaphysics, defined as knowledge dealing with a world lying beyond and outside experience, is obviously impossible. That which has never entered into experience, says Dewey, is meaningless. Meanings arise within experience as a result of seeing, hearing, manipulating, etc. Persons, objects, things in nature acquire the meanings they do as the result of the way they function in human experience. Careful analysis of such typical metaphysical terms as "Absolute," "God," "soul," "thing-in-itself" reveals them as meaningless because they are without any real connections in experience.

Dewey finds that traditional metaphysics and religion are the results of man's desire to have a stable and dependable world—a world in which his values are safe. The knowledge gleaned from everyday experience and the knowledge represented in science cannot guarantee such a world. Such knowledge discloses a world of only relative security. Hence men have recourse to "reason," "revelation," "mystic intuition," etc., and claim that the knowledge yielded by these is more trustworthy in these matters than are science and everyday experience. The hold which metaphysics and religion have on men's minds is the outgrowth of this demand for absolute certainty.

But metaphysics, defined as a description of the "generic traits" of existence, is possible. It tells what are the distinguishing features of the universe which we daily experience. It reports that the world is one of change, that it is a world in which joy and suffering, success and failure, good and evil, beauty and ugliness are all possible. It is a universe of uncertainty, precariousness, and unpredictabilities; at the same time it is a universe which contains regularities, law, and order. It is a world in which man, within certain limits, can fashion his own life, culture, and civilization.

An empirical metaphysics, thus, teaches that man must create his own security and happiness out of the materials which the world here and now supplies. Dewey's moral and social philosophy aims to provide insights which will help man in this endeavor. Happiness, Dewey believes, consists in the realization of the self, in the fulfillment of the powers and potentialities, the desires and interests of the individual. But in seeking this happiness the individual must not ignore the right of others to be similarly happy. To harmonize the happiness of the individual with the happiness of others the individual must cultivate interests in objects and relationships which are as acceptable to others as to himself. An older psychology taught that man is inherently and unalterably selfish and that the only way to make him regard the good of others when this conflicts with his own is through a system of external rewards and punishments. Dewey's more accurate psychology finds human nature pliable and potentially capable of finding its happiness in the pursuit of values in which others can share. The idea of "shared experience" constitutes the heart of Dewey's moral and social philosophy as it did that of Plato and Aristotle.

Democracy, Dewey believes, is the morally best form of organized society because it aims at the happiness of each individual irrespective of birth, color, creed, or race, and because it gives the individual a voice in determining policies which affect his well-being. Democratic theory holds that social institutions are called into existence to promote the happiness of individuals. This means that there is nothing sacrosanct about institutions as such—they may be criticized and altered as human needs require. For institutions to retain the essence of democracy while changing their external form, it is necessary for the people to know what this essence is. Perhaps Lincoln expressed this best when he described a democratic government as a government of the people, by the people, and for the people. Amid all the external changes which an institution or society may undergo, if it remains of the people, by the people, and for the people affected by it, we may judge it to have retained its essentially democratic character.

Since human happiness and well-being are the supreme goals of human existence, the individual must be trained to do his share in attaining them. Thus education, for Dewey, is the capstone of all philosophy. And since the highest values grow out of men's associations with each other, education must above all else fashion the individual into an intelligent and morally responsible member of the community. Among the criticisms which Dewey makes of traditional education are these: first, traditional education views education as essentially a process in which children, made passive, are given information from sources external to themselves—the "spectator" theory of knowledge in slightly different guise; second, it treats children as potential adults, and gives them subject-matter which is in large measure divorced from the child's own experience; third, it employs a discipline which too often is arbitrary and externally imposed.

DEWEY'S PHILOSOPHY OF EDUCATION

These criticisms give a cue as to some of the main principles of Dewey's philosophy of education. Education, he argues, is experience in which the child learns by doing, experimenting, weighing alternatives, etc. Carefully thought-out projects which require the active participation of the child are best calculated to develop in him appropriate ideas, attitudes, and habits. Second, the child is an end-in-himself, and his desires and interests must be respected and not ignored in favor of those of adults. Subject-matter must be vitally related to the child's experience, and as this matures subject-matter must be correspondingly changed. Finally, discipline and control are to be determined by rules growing out of the needs and demands of the situation just as in a game. The role of the teacher is that of an umpire enforcing rules recognized by the children as necessary to the successful continuance of the activity in which they are jointly engaged.

Dewey's principles found a sympathetic response in many quarters of the educational world. "Progressive education" took root and expanded rapidly. Unfortunately, many of those who were dissatisfied with traditional education and wanted to reform it along the lines suggested by Dewey did not fully comprehend him, and so misapplied his principles. Accepting the notion that children learn by doing many teachers viewed activity as an end-in-itself, and were satisfied if children in the classroom are busy and active. This obviously is unwise as pupils may be engaged in activities which develop habits and attitudes which are the opposite of those we desire. The duty of the teacher is to provide worthwhile projects in which the traits we strive for have an opportunity to be cultivated. Again, many educators, believing that traditional education tends to neglect the desires and interests of the child, went to the opposite extreme, and offered subject-matter which catered to almost every childish whim and caprice. What such practice overlooks is that the child needs to learn how to choose among his desires. He must be trained to select only the best for fulfillment and to foreswear the rest. The task of the teacher is to help him in this and to arouse in him an interest in worthwhile and useful subject-matter. Finally, recognizing that older methods of discipline are too arbitrary and external, many teachers acted as though no control is necessary and that any intervention by the instructor is an invasion of the child's rights. The danger here is that such a procedure ill prepares a child for life in association with others. The teacher's duty is first of all to work out with the children the rules and regulations which the activities of the classroom and playground require and then to see that these rules are adhered to.

In view of what was taking place in many of the schools which claimed to have adopted the Deweyan philosophy of education, it is no wonder that his theories were widely misunderstood and condemned by a considerable portion of the public at large. When Dewey's principles are clearly conceived and intelligently applied under conditions which enable them to operate effectively, their wisdom and practicality become more apparent.

Again and again the charge is made that Dewey's philosophy and theory of education are the intellectual expression of American materialism and practicality and that they leave mostly unexpressed mankind's concern with spiritual and cultural values. This charge overlooks Dewey's emphasis that ideas are instrumental not only to material values but to spiritual and cultural ones as well. The good life to which Dewey's moral, social and educational philosophy points is one

in which these latter values are central and dominant. Material values are entitled to a place in human life, but they must not usurp the place which properly belongs to the things of the spirit. One of the most moving passages in Dewey's philosophy is that found in his *A Common Faith:*

> The things in civilization we most prize are not of ourselves. They exist by the grace of the doings and sufferings of the continuous human community in which we are a link. Ours is the responsibility of conserving, transmitting, rectifying and expanding the heritage of values we have received that those who come after us may receive it more solid and secure, more widely accessible and more generously shared than we have received it.

This statement eloquently sums up the task which confronts anew each generation and, in particular, its institutions of learning.

MATTHEW ARNOLD ON THE TEACHING OF SCIENCE

(*Continued from page 262*)

> received, somewhat over-ambitious, English name for the kind of thing)[33] should aim at; it should aim at systematising for the use of our schools a body of simple instruction in the facts and laws of nature, so as to omit nothing which is requisite, and to give all in right proportion . . .
>
> For school-children under thirteen as much of mechanics, animal physiology, physical geography, and botany as they need, may surely be comprised in their class-lessons in elementary *Natur-Kunde*. The right place for mechanics, animal physiology, physical geography, and botany is not, it seems to me, in the programme of the elementary school, but in the programme of the evening classes which the scholar should attend after he is past thirteen and has left the elementary school.[34]

Readers of the *Letters* will recall how in his pleasant correspondence with his youngest sister Fan, he seldom failed to mention some plant, usually by its scientific name. "Tell Fan," he wrote to his mother, "the slopes of the clay cliff were covered with the wild parsnip, its broad hats of yellow honey-coloured flowers very rich and tempting. Tell her I have also found out that the Essex plant I thought was hemlock is the sheep's parsley; and the true hemlock I have discovered near Harrow, such a handsome plant, and quite unmistakable when you have once seen it. I will take her straight to it when she comes to us next spring. Mr. Gibson has sent me another copy of his *Essex Flora*. I had given away the first, so I am getting quite a botanical library."[35] One of his chief interests on his visits abroad, especially in America, was the native flora, particularly its likenesses with, and differences from, that which he had studied all his life, as an amateur botanist on his own English countryside. Arnold's concern for science as a part of the curriculum for schools was inspired by no desire to compromise or to conciliate an encroaching interest; it sprang from a genuine faith in the cultural power of natural knowledge, from a solicitude differing not at all in kind but only in degree from that which he felt for literature itself.

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[33] Huxley, in confronting the same dilemma of finding a suitable term, had used *Erdkunde*, or earth knowledge (*cf. Collected Essays*, Vol. III, pp. 108–109.)

[34] *Reports on Elementary Schools*, pp. 204–207.

[35] *Letters*, Vol. II, pp. 33–34.

EXPERIENCE IN CONTEMPORARY EDUCATION: II

Dewey's Concept of Experience

BY JOE PARK

IT HAS BEEN SHOWN IN AN EARLIER ARTICLE THAT DEWEY REJECTED what he called the traditional philosophical concept of experience. Those who held this view of experience, although they did not always fully agree, believed that experience could not rise above the particular, the probable, and chance. To attain the universal or absolute, it was necessary for these philosophers to appeal to a power which transcended all experience gained through the body and its senses.

To Dewey this was a quest for a certainty which was forever to be denied man. Too, this quest took man into another world of thought which tended to cause him to neglect the improvement of conditions in this world.

Dewey concluded from his study that the old concept of experience was itself a product of experience. By this he meant that experience to Plato and Aristotle was quite similar to what we now know as "trial and error" learning. Of this kind of experience he wrote:

> "Men tried certain acts, they underwent certain suffering and affections. Each of these in the time of its occurrence is isolated, particular—its counterpart is transient appetite and transient sensation. But memory preserves and accumulates these separate incidents. As they pile up, irregular variations get cancelled, common features are selected, reinforced and combined. Gradually a habit of action is built up, and corresponding to this habit there forms a certain generalized picture of an object or situation."[1]

Because such generalizations are restricted and fallible, they hold true in most cases, but not in all. Thus, in order to secure the certainty which men frequently desire, it was necessary for the philosophers to take flight to a region above experience. Absolutes and basic principles were sought. But these, Dewey suggested, left experience behind and untouched. These principles did not come into play in such a manner as to correct the sources of experience.

But, a new concept of experience became possible as a new notion of the method and content of experience developed, and as psychology, based upon an understanding of biology showed that whenever there is life there is activity and behavior. And in order for life to continue, it is necessary for the living thing to continue its activity and behavior through both adapting to and changing its environment. As a result, experience must involve doing, acting, changing. The organism does not merely exist in a state of inactivity, waiting for something to happen to it. The organism acts in terms of its structure and potentiality

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[1]John Dewey, *Reconstruction in Philosophy* (A Mentor Book: 1920), p. 78.
[2]*Ibid.*, p. 83.

upon its environment. The environment, being changed, then reacts upon the organism. And since this process is never ending, Dewey could say:

> This close connection between doing and suffering or undergoing forms what we call experience. Disconnected doing and disconnected suffering are neither of them experience.[2]

Thus sensation is only the beginning of knowledge. Sensation triggers, or stimulates, investigation which in turn produces knowledge. Experience includes both sense stimulation and orderly investigation.

One may burn his hand as he tries to snuff a candle with his index finger and thumb. This burn does not represent experience until there is a connection made between the lighted candle, the heat produced from the candle, the burn, and the pain. When the burning candle is seen to be a possible cause of pain, and when the pain is seen to be caused by too close contact or too slow reaction time, then the person may be said to have had an experience. Thereafter, he can prevent a burn from the candle by avoiding it, by limiting the amount of time the hand is in contact with the heat produced by the flame, or perhaps by using a candle snuffer.

Dewey summed up the whole situation very nicely in his *Democracy and Education* when he concluded that: "(1) Experience is primarily an active-passive affair; it is not primarily cognitive. But (2) the *measure of the value* of an experience lies in the perception of relationships or continuities to which it leads up."[3]

Scientific Method and Reflective Thinking

The establishment of the relationships of which he speaks can most satisfactorily be brought about by the systematic application of the steps involved in the scientific method. Thinking becomes the intentional endeavor of a person to find the specific connections which exist between something that happens to him, or that he does, and the consequences which result. The process involved Dewey called the phases, or aspects, of reflective thinking. Reflective thinking is the means used to establish the connection that completes the act of experiencing. In a word, reflective thinking stands between perplexity and confusion and the postreflective state of mastery, satisfaction, and enjoyment in Dewey's philosophy.

Reflective thinking, or the concept of inquiry, looms large in the philosophy of Dewey. He devoted one whole volume to the subject, as well as making numerous references to it in his other writings. In the book on thinking he described five phases of reflective thinking:

> (1) *Suggestions*, in which the mind leaps forward to a possible solution; (2) An intellectualization of the difficulty or perplexity that has been *felt* (directly experienced) into a *problem* to be solved, a question for which the answer must be sought; (3) the use of one suggestion after another as a leading idea, or *hypothesis* to initiate and guide observation and other operations in collection of factual material; (4) the mental elaborations of the idea or supposition as an idea or supposition (*reasoning*, in the sense in which reasoning is a part, not the whole, of inference); and (5) testing the hypothesis by overt or imaginative action.[4]

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[3]John Dewey, *Democracy and Education* (New York: The Macmillan Company, 1916), p. 164.
[4]John Dewey, *How We Think* (Boston: D. C. Heath and Company, 1933), p. 107.

It should be pointed out at this juncture that this concept of experience has considerable importance for education. Dewey saw the emancipation and enlargement of experience to be the task of education. He conceived of education taking the relatively plastic youngster with his attitude of experimenting, wondering, questioning, and developing him into a person who could inquire systematically, thus "short-circuit for the individual the slow progress of the race, eliminating the waste that comes from inert routine and lazy dependence upon the past."[5]

In another place he records the importance he accords to experience in education.

> The sole direct path to enduring improvement in the methods of instruction and learning consists in centering upon the conditions which exact, promote, and test thinking. Thinking *is* the method of intelligent learning, of learning that employs and rewards the mind. We speak, legitimately enough, about the method of thinking, but the important thing to bear in mind about method is that *thinking is method, the method of intelligent experience in the course which it takes* (italics mine).[6]

Education, in this philosophical context, must place a premium on thinking if it is to be consistent. Indeed Dewey does place a premium on it. He begins, however, by insisting upon the necessity of an actual empirical situation being present in the initial phase of the learning situation. He stated that the first stage of contact with any new material, at whatever level of maturity, should be of the trial and error sort. As he said in one place, the first approach to a subject should be unscholastic, otherwise thought may not be aroused; only words may be acquired. Dewey meant for the individual "to do something with material in carrying out his own impulsive activity, and then note the interaction of his energy and that of the material employed."[7]

He demanded that the learner be given something to do, not something to learn. From this sprang the idea of learning by doing. But Dewey continued to say that the doing should be of such a nature as to *demand thinking*, "an intentional noting of connections." From such activity, learning would naturally result. The learning situation created, however, should suggest something to do that was new, problematical in nature, but still connected with individual habits and capacities so that the new will call out effective responses. Effective responses to Dewey were responses which "accomplish a perceptible result, in distinction from a purely haphazard activity."[8]

CONTINUITY AND INTERACTION

In all of the writings Dewey made clear that there is a difference in the quality of experiences. One experience is not as valuable as another. Experience for experience sake, especially on the level of mere enjoyment or empirical experience divorced from thought, is rejected. In 1916 he wrote: "The most significant question which can be asked, accordingly, about any situation or experience proposed to induce learning is what quality of problem it involves."[9]

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[5] *Ibid.*, p. 202.
[6] *Op. cit.*, pp. 179–180.
[7] *Ibid.*, p. 181.
[8] *Ibid.*, p. 182.
[9] *Ibid.*, p. 182.

By 1938 he was more convinced than ever that this was the crux of the whole affair. In *Experience and Education* he established two principles by which experience should be evaluated.

The first principle was continuity. This principle rested on Dewey's interpretation of habit. By habit he meant that every experience modifies the one who undergoes the experience. This modification may be for good or bad, and directly affects the nature and quality of future experiences. Habit included more than a fixed way of doing something. It suggested to him "the formation of attitudes, attitudes that are emotional and intellectual; it covers our basic sensitivities and ways of meeting and responding to all the conditions which we meet in life."[10]

Since every experience contains some kind of continuity, that is, it influences habit, the nature of that influence must come under question. As Dewey put it, "Its value can be judged only on the ground of what it moves toward and into."[11]

Is the child to determine for himself the nature and direction of all his experiences? No! This is made clear when Dewey explicitly explains that the greater maturity of experience which the adult has, places the teacher in a position "to evaluate each experience of the young in a way in which the one having the less mature experience cannot do. It is then the business of the educator to see in what direction an experience is headed."[12]

Does this give the instructor dictatorial powers? Again the answer is no! He is to exercise his responsibility for guidance with sympathy. And Dewey states that it is this avoidance of dictation and the acceptance of the responsibility to guide sympathetically that makes the task of the teacher or parent so difficult.

But, the difficulty does not end here, it would seem. Beyond sympathetic guidance is the responsibility to use the physical and social environments so they will contribute to building worthwhile experience. It is exactly at this point that Dewey offers a second criterion to be used in selecting experience. This he calls *interaction*.

He begins by showing that the difference between literate and non-literate societies "is found in the degree in which previous experiences have changed the objective conditions under which subsequent experiences take place."[13] He continues by indicating that man lives in a world of persons and things. These persons and things are in large part what they are because of what has been done to them or transmitted to them from previous human activity. He then suggests that the educator is to "utilize the surroundings, physical and social, that exist so as to extract from them all that they have to contribute to building up experiences that are worthwhile."[14] By physical and social surroundings Dewey meant the conditions present in the various aspects of culture.

Thus interaction means selections from the social and physical surroundings those elements which will generate "an experience that has educative quality with

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[10]John Dewey, *Experience and Education* (New York: The Macmillan Co., 1938), p. 27.
[11]*Ibid.*, p. 31.
[12]*Ibid.*, pp. 31–32.
[13]*Ibid.*, p. 34.
[14]*Ibid.*, p. 35.

particular individuals at a particular time,"[15] and in turn modify these surroundings to insure a higher quality of experience being produced in the future.

To summarize, the two criteria for judging the worth of an experience are *continuity* and *interaction*. The former evaluates experience on the grounds of the possiblity of future worthwhile experience for the learner. The latter points to a wise use of the surroundings to provoke experience. In turn this implies a change in those surroundings as a result of experience with them. In this manner the source of experience can be improved.

CONTINUITY AND INTERACTION IN EDUCATION

If the above discussion adequately defines Dewey's idea of experience and sets forth his criteria for selecting it, the question may properly be asked: Can these ideas be applied to education? That Dewey conceived of his thoughts on experience being directly related to education can not be subjected to a shadow of a doubt. His technical definition makes this abundantly clear.

> It is that reconstruction or reorganization of experience which adds to the meaning of experience, and which increases ability to direct the course of subsequent experience.[16]

Also he defined philosophy as "the general theory of education." And, if further evidence is needed, he could continue in the very next sentence: "Unless a philosophy is to remain symbolic-or verbal-or a sentimental indulgence for a few, or else mere arbitrary dogma, its auditing of past experience and its program of values must take effect in conduct."[17]

Upon seeing this relationship, some have sought for a series of specific techniques of teaching in the writings of Dewey. They have been disappointed. There must have been at least two reasons why Dewey did not provide such specific techniques of instruction.

First of all, he was a modest man and he must have realized that he had not mastered the techniques of teaching. In the words of one of his students, Dewey was a poor teacher, with the exception perhaps of his work in a seminar. Furthermore, he was dealing with method, that is the scientific method as a system of inquiry, not with techniques of classroom instruction. The nature of the latter, as every student of education must know, is quite different.

In the second place, Dewey must have wished to avoid presenting a closed system. His philosophy was dynamic. His position had to remain open to change as new ideas developed. To have formulated specific classroom procedures to be followed by all would have revealed that he was unfaithful to his own philosophy.

Therefore he had to be content to deal in broad outlines. The classroom teacher could take this philosophical ground work and project it into a set of working principles.[18] That he had considerable faith, perhaps too much faith, in the ability of the teacher to translate his philosophy into action seems evident from Hook's description of the man:

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[15] *Ibid.*, p. 45.

[16] John Dewey, *Democracy and Education* (New York: The Macmillan Company, 1916), pp. 89–90.

[17] *Ibid.*, p. 383.

[18] Irwin Edman, *John Dewey: His Contribution to the American Tradition* (Indianapolis: The Bobbs-Merrill Company, 1955), pp. 24–25.

> He has a sense for what is authentic and original in every person's experience and a way of inducing the self-confidence which is a pre-requisite for its adequate telling . . .
>
> Deeply appreciating books and book learning, he treasured most the reflective articulation of those who have grappled with problems first hand.[19]

It should be added, however, that Dewey did write on the nature of method in a slightly different sense in Chapter XIII of *Democracy and Education*. Here he pointed out that method ". . . is simply an effective treatment *of* material—efficiency meaning such treatment as utilizes the material (puts it to a purpose) with a minimum of waste of time and energy."[20]

In this same place he warns against isolating method and subject matter. He saw at least four evils attendant upon the separation of the two. First of all, he thought the separation led to a neglect of concrete situations of experience. Method can only be derived from careful observation of what happens in a specific learning situation, "with a view to seeing that it happens better next time."[21] Second, the separation of method and subject matter could result in erroneous concepts of discipline and interest, tickling the palate or appeal to effort and work without reason or meaning. Third, learning might become an end in itself. Students might be encouraged to learn something just for the sake of learning it. This can result in learning divorced from meaning. Fourth, method could become a cut and dried routine. This is what has happened to technique of instruction to a considerable extent.

Dewey did not have a blind hope attachment to classroom techniques. Earlier in this same work he had written that no amount of improvement in the technique of the instructor would wholly remedy the absence of curiosity among children in school. "There must be more actual material, more *stuff*, more appliances, and more opportunities for doing things before the gap can be overcome. And where children are engaged in doing things . . . it is found, even with comparatively indifferent modes of instruction, that children's inquiries are spontaneous and numerous, and the proposals of solution advanced, varied and ingenious."[22]

With what is the teacher left? The one who is searching for a specific set of techniques is disappointed. He has failed to grasp the meaning of Dewey's philosophy of education. The teacher who sees in Dewey's philosophy of education the establishing of learning situations which promote curiosity, questioning and perplexity concerning matters of importance has grasped the starting point in instruction. *But only the starting point.* This questioning, perplexity and curiosity then must be harnessed. The learner has to pursue systematically his curiosity by means of employment of the scientific method of problem solving. Finally, a tentative solution may be reached that can be applied overtly or by means of imagination. Throughout this process, the teacher guides the learner in terms of established criteria for selecting experiences, by means of techniques learned from first hand experience in instructing or from those who have had experience in instructing. But when such techniques are employed they are used to facilitate the learning of significant subject matter in the context of experience as defined by Dewey.

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[19]Sidney Hook, *John Dewey, An Intellectual Portrait* (New York: The John Day Company, 1939), p. 18.

[20]*Op. cit.*, p. 194.

[21]*Ibid.*, p. 197.

[22]*Ibid.*, p. 183.

DEWEY'S INFLUENCE IN THE SCHOOLS

It is fair, of course, to inquire into the influence of this concept of experience on education. Unfortunately, research studies made by competent educators on this subject are most conspicuous by their absence. While philosophers have given attention to the study of the nature of experience and to Dewey's philosophy of experience, they too have not given much attention to the influence of his philosophy on educational practice.

On the occasion of the celebration of the seventieth birthday of John Dewey, Newlon spoke on "John Dewey's Influence in the Schools." Although his remarks were entirely laudatory, he pointed out that there had been a revolution in education and that this revolution had been influenced by Dewey. He suggested that Dewey had contributed to the development of four current principles of education. Among these four was the idea that "education is a process of experiencing". Newlon showed that from 1900 to 1930, education had embraced in practice "significant pupil activity", socialized recitation, the problem and project method, extensive use of library sources, field trips and unified social studies. The development of these practices could be attributed at least in part to Dewey.[23]

Edman, in a more recent statement, has perhaps stated an opinion held in common by many of Dewey's disciples and former students. This author states that Dewey's philosophy ". . . has had phenomenal influence" on education.[24]

Another recent writer has referred to Dewey as the "symbol of modern education" in America.[25] Insofar as Dewey was the guiding hand behind the experimental philosophy of education, he contributed to: (1) connecting the school and culture in a vital manner, (2) the development of the idea of growth and wholeness of the learner.[26] In both of these Dewey's concept of experience can be seen.

But there are those who have held that Dewey's contributions in general, and in the area of experience in particular, have not been entirely positive. Three examples will bear out this contention.

Murphy has suggested that Dewey has conceived of experience as the "terminus of all knowing". This ignores experiences as ". . . the essential link between man and a world which long antedates his appearance in it." He goes on to explain that:

> If this latter account is true, all statements about a natural environment outside of these immediate experiences become on analysis simply means of facilitating cognitive transitions to such enjoyed immediacies and the world which should have provided the background for our experience . . . "collapses into immediacy," and Mr. Dewey's naturalism reduces . . . , to a "philosophy of the foreground."[27]

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[23]Jesse H. Newlon, "John Dewey's Influence on the Schools", pp. 37–64 in Henry W. Holmes et al., *John Dewey, the Man and His Philosophy* (Cambridge: Harvard University Press, 1930).

[24]*Op. cit.*, pp. 22–23.

[25]R. Freeman Butts, *A Cultural History of Western Education* (New York: McGraw-Hill Co., Inc., 1955), p. 406.

[26]*Ibid.*, pp. 563–565.

[27]Arthur E. Murphy, "Dewey's Epistemology and Metaphysics" in Paul Arthur Schilpp, *The Philosophy of John Dewey* (Northwestern University, Evanston, Ill.: The Library of Living Philosophers, Vol. I., 1939), p. 221.

(*Continued on page 280*)

THE GREATEST WASTE IN AMERICAN EDUCATION

BY HOWARD TAYLOR

ONE MAJOR CONCERN OF THE AMERICAN PEOPLE TODAY IS THE IMPENDING CRISIS IN THE PUBLIC SCHOOLS. Increase in enrollment, shortage of teachers, and overcrowded school buildings confront almost every community; and the transition from racial segregation to integration will make these problems especially acute in some school systems. The financial burden which these conditions have created is more than many communities can carry under their present tax structure. Of course, the easy way out would be to shift this financial burden to the Federal Government; and there are in Washington, both in and out of government service, those who would be glad to have Congress assume this responsibility.

But before moving farther away from local control of schools to more federal aid, or before amending state constitutions to permit higher local tax levies for the support of schools, it might be worth-while to examine the public school program more critically in order to get a clearer understanding of the factors that combine to create this obvious and very real emergency in public education. It may be that the burden could be lightened and the crisis met by making a very few fundamental changes in the school program.

The past few decades have seen the expansion of the functions of the public schools, the enrichment of the curriculum at every level, especially in the junior and the senior high schools. In hundreds of cities of approximately 5,000 population where the senior high school comprises the tenth, eleventh, and twelfth grades, with twelve units required for graduation, a student could spend from eight to twelve years in high school without ever repeating a subject. In the larger city high schools, a student could attend for more than thirty years without repeating any work now offered. As a matter of fact, so many new subjects would doubtless be added from time to time that a student could attend such a high school indefinitely, if not prevented by a legal age limit.

This expansion of the curriculum has been due to social pressure upon the schools to offer more practical training. This trend is, without question, an excellent thing since the schools should meet the needs of the pupils. But while this is being done, there is a growing tendency for students to enroll in all kinds of courses for which they have no genuine need, but only a temporary and trivial interest. Many a boy may prefer a course in auto mechanics to a stiff course in algebra or chemistry for no other reason than that he wants to build a "hot-rod." While thousands of high school boys and girls are happily learning vocational skills they will never use, there is an increasing unmet demand in industry for young people well trained in mathematics and the basic sciences.

Many educators are aware of a need for reorganization of secondary education. The American public schools of today are the outgrowth of a large number of forces, many conflicting, others unrelated, and some well coordinated. Before the era of the automobile and of good roads, thousands of schools were open only three months of the year. With the advent of better roads and better means of

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transportation, the school term was gradually lengthened so that by the nineteen twenties the ideal nine-month term of 180 school days was generally realized.

When schools were open for only three months a year, it took all of eight years to cover reading, writing, and arithmetic, spelling and geography. During long vacations, the children forgot much of what they had learned so that each year much time was spent in review. Many boys and girls were nearly grown before they ever got to study the last part of Ray's *Practical Arithmetic*, a popular textbook around 1890.

With the lengthening of the school term, there came an enrichment of the curriculum so that the elementary school remained an eight-year school, although a bright boy or girl could cover the essential subject matter of the eight years in four or five years.

In the same way, the work of the secondary school was expanded to take up the added time and the high school became a four-year school as a matter of course. Now, many experimental programs are in process to see if students can profitably enter college at the end of the eleventh grade. Thus far, the evidence from these experiments is that students not only save a year of time, but do as well or better work in college than those who complete the twelfth grade. The most serious opposition to these experiments comes from the secondary school principals, who believe that the social values of the senior year in high school are too great to be neglected. These social values are largely in the school activity program and certainly are valuable; but if the eleventh grade were the senior year, these values would accrue in that year. Sixteen units, four of which are earned in the junior high school, are usually required for high school graduation, but few students graduate with only sixteen units. These excess units are doubtless valuable; but in the face of overcrowded school buildings, classes too large for instruction, and a serious shortage of competent teachers, this may be an extravagant use of the resources available for education. Surely eleven years of nine-month schooling ought to be enough time to learn to live effectively or to prepare for college. And why close the schools for three months each year? Twenty school days added to the school term would be more than equivalent to a year of instruction.

Another source of great waste in American education is at the beginning rather than at the end of the school program. Does anyone know why all little boys and girls should start to school when they are six years old? It is well known that about all they have in common is that they have all made six trips around the sun. Chronological age is the only respect in which children born on the same day are equal. As they grow, the differences become more and more apparent. They vary by many months in the time of sitting alone, crawling, teething, walking, and talking and in the growth of readiness to learn.

FIRST-GRADE REPEATERS

From the point of view of heartbreak and discouragement to hundreds of thousands of little children, the greatest waste in education grows out of this general practice of compelling all children to start to school at the age of six. Quantitatively this is the cause of the greatest waste of teacher time and of classroom facilities. Maturation, the rate and degree of maturity, as a factor in success in the first grade of the public school is not merely an academic question of relatively mild theoretical interest, but it is of genuine practical concern in

the face of the present educational crisis. The following table compiled from data furnished by the Office of Education in the Department of Health, Education and Welfare under date of January 7, 1955, shows what happens to the nation's army of six-year old children as they enter the first grade and go on to school for three years:

ENROLLMENT, BY GRADE, IN FULL-TIME PUBLIC SCHOOLS FOR SPECIFIED YEARS.

Grade	1942–43	1943–44	1944–45	1945–46	1946–47
1	2,919,242	2,878,843	2,881,849	2,894,588	2,896,451
2	2,228,945	2,220,739	2,265,796	2,318,502	2,319,772
3	2,179,843	2,162,878	2,173,078	2,190,617	2,204,573
Grade	1947–48	1948–49	1949–50	1950–51	1951–52
1	2,951,300	3,067,375	3,170,343	3,053,000	2,957,000
2	2,363,477	2,502,828	2,644,707	2,739,000	2,670,000
3	2,258,858	2,314,645	2,395,904	2,601,000	2,718,000

Now just what do these figures mean? Well, in 1942–43 there were 2,919,243 children in the first grade; but the next year, 1943–44, only 2,220,739 children were in the second grade. What happened to the other 699,504 children? Three things could have happened: some were killed on the way to or from school; a few of them—the brighter and the more mature—skipped the second grade and showed up in the third grade in 1943–44; but the overhwelming majority of them repeated the first grade in 1943–44.

An examination of the table will reveal that this tragic waste goes on year after year. Other figures are available to show that this thing has been happening to our children decade after decade, although conditions are not as bad now as twenty or thirty years ago. Stricter laws and better enforcement now keeps thousands of children just barely past five years of age from entering the first grade. Some states require that a child be six before November 1 of the year he enters school. This certainly is better than defining six years as just more than five and one-half. When that was the common practice throughout the United States, approximately one-third of all the first graders repeated the first grade; and, in some states, as many as one-half of the first graders were repeaters.

But even today, in many states and school districts, the proportion of failures in the first grade is far greater than the table given here shows. For example, the following table gives the facts about Mississippi, a state which is struggling with an extremely difficult educational situation:

ENROLLMENT BY GRADES

Grade	1950–51	1951–52	1952–53	1953–54
1	115,186	106,917	106,574	106,839
2	63,209	61,441	57,619	59,189
3	59,680	60,465	57,615	54,317

Evidently, approximately 45% of the first graders in Mississippi repeat that grade. It is generally true that in schools with a high percentage of slow-

growing and immature first graders, there is a correspondingly high percentage of failures in the first grade. Another significant and interesting fact revealed by enrollment figures is that the loss from the second to the third grade is very small. As a matter of fact, it is not unusual for the enrollment in the third grade to be higher than it was in the second grade of the preceding year. This may be due to the fact that there are practically no failures at the end of the second year and that large numbers of bright children skip from the first to the third grade.

Critics of the public schools have frequently bemoaned the fact that the schools lack the power to hold the students. They cite statistics to show that only about one-third of the children entering the first grade go on to complete the twelfth. And they seem to have the figures to prove it. For instance, according to the Biennial Survey of Education 1948–50, there were 3,167,803 children in the first grade in 1938–39; but twelve years later, 1949–50, there were only 1,122,872 in the twelfth grade—a loss of 65% But what a different picture appears if the twelfth grade enrollment of 1949–50 is compared with the second grade enrollment eleven years before, 1939–40. In that year, there were 2,333,076 in the second grade, so that the apparent loss at the end of the twelfth grade is only 50%—a very good record indeed.

No matter what interpretation is put upon enrollment figures, the fact remains that nearly 700,000 children are failing the first grade and taking two years to learn this work. This means about 26,000 first grade teachers are using classrooms and spending time teaching these children twice. This is the equivalent to two thousand ten-room elementary school buildings.

The greatest loss in this needless waste is not the prodigal use of classrooms and of teachers' time, but rather it is the blighted hopes of the children and their discouraging failure at the very beginning of their school life. To be left behind for another year in the first grade while so many of their companions and playmates are promoted is a truly heartbreaking experience for multiplied thousands of little children. Yet nearly all of this misery and waste is preventable. If these children were allowed to grow for another year—take one more trip around the sun—they would then have the reading readiness and physical and mental maturity needed to do the work of the first grade.

To summarize briefly, the greatest waste in American education—waste of classrooms, teaching time, and child life—is due to two things: (1) sending children to school before they are old enough to do the work; (2) keeping them in school a year longer than necessary to give adequate preparation for life or college.

If children were kept at home until they are seven years old, practically all of them would succeed in the first grade, fewer would be killed in traffic accidents, and they would move on through the years of schooling with a feeling of accomplishment and a spirit of hope and enthusiasm born of success.

If the work of the junior and senior high schools were reorganized, any student could get a better education in five years than the vast majority of them now get in the traditional six years.

With the prospect of military service confronting every high school boy, isn't a year of his life worth saving? The educational program can be improved, time can be saved, and prodigal waste eliminated if the American people have the will to do it. To cut the public school program from twelve to eleven years

may seem radical, but for many years the public schools of Texas operated on this basis. It worked successfully there and in other places until social pressure compelled conformity to the twelve-year pattern. To cut one year from the school program would not be quite the same as increasing by one-twelfth the number of classrooms and teachers, but it would do more than any other one thing to relieve the overcrowded condition of our schools and to reduce the serious shortage of competent teachers.

EXPERIENCE IN CONTEMPORARY EDUCATION (*Continued from page 275*)

But it would be unfair to suggest that Murphy saw nothing of value in Dewey's concept of experience. For he believed that:

> In so far, however, as this philosophy has been . . . a project for the use of philosophic analysis and criticism for the clarification of basic ideas and the coordination of the various aspects of the world as experienced and known, the conclusion offered amounts to a suggestion for its wider and more consistent application.[28]

Santayana likewise called attention to the "immediate" in experience as defined by Dewey. He believed that the immediate was always specious and "only the dream which accompanies our action." And, he continued ". . . every naturalist knows that this waking dream is dependent for its existence, quality, intensity, and duration on obscure processes in the living body. . . ."[29]

A close disciple of Dewey has expressed concern that Dewey's philosophy has not been carefully practiced in educational circles. He believed that schools could have been saved from much waste and criticism had they given proper heed to the criteria for the evaluation of an educational acitivity.[30] While this is not a criticism so much of Dewey as of his followers it does raise an interesting question as to why the heed was not given. Could it have been due in part to the failure of the disciples of Dewey to understand their master?

[28] *Ibid.*, p. 225.

[29] George Santayana, "Dewey's Naturalistic Metaphysics" in Paul Arthur Schilpp, *The Philosophy of John Dewey* (Northwestern University, Evanston, Ill.: The Library of Living Philosophers. Vol. I., 1939), p. 256.

[30] John L. Childs, "The Educational Philosophy of John Dewey" in Paul Arthur Schilpp, *The Philosophy of John Dewey* (Northwestern University, Evanston, Ill.: The Library of Living Philosophers. Vol. I., 1939), p. 427.

THE SCIENTIFIC METHOD (*Continued from page 248*)

if at all, with the second aspect of scientific method, creation. He realizes the role of creative conceptualizing only as he begins researches which cannot be served by discovery alone. Usually, by this time, he has become so hidebound by the half a lifetime he has spent in learning to be a discoverer of facts that he finds himself unable to burst his bounds and become the truly creative scientist which should have been his destiny.

But the implications for education we have set forth will remain fruitless until, in the words of Woodger, ". . . teachers have themselves been trained in methodology, and the present erroneous beliefs about such matters cease to be current. . ."[14]

[14] Woodger, *op. cit.*, p. 61.

COMMENTS ON *THE PROBLEM OF UNIVERSALS IN PHILOSOPHY OF EDUCATION*—BY GEORGE BURCH

BY HARRY S. BROUDY

PROFESSOR BURCH'S PAPER LEANS HEAVILY ON THE ANALOGY BETWEEN TEACHER-PUPIL-KNOWLEDGE AND PARENT-CHILD-LIFE. He calls this relation "metaphysical", one which can be understood only through a theory of universals, and the class theory of universals is the only one that can do the trick. It alone is appropriate to the understanding of living things, in that it regards the species as the class of essences of its individuals, and this species changes as it acquires new individuals.

From the analogy he concludes that the teacher in liberal education is neither an artisan working from a design nor a gardener nurturing a growth already predestined by the seed. He is rather like a parent who gives his form to the pupil by perpetuating his own culture. Liberal education is a spontaneous activity of free men and consequently purposeless.

Professor Burch also rejects the notion that there is an essential core of knowledge or wisdom that constitutes liberal education or that there are tendencies in human nature that could serve as guides to the educative process.

Now that there can be learning without design or purpose is so true that to live in a culture without learning from it is virtually impossible. Nor would we deny that the bulk of this learning goes on without formal instruction. The question is whether what is so learned is what is commonly meant by liberal education or even what Professor Burch seems to mean by it.

One might also agree that no fixed courses or set of books necessarily constitute liberal education, but there may be *types* of knowledge, e.g., knowledge of self, society, things, that are essential, and one might argue that certain habits of acquiring, using, and enjoying knowledge transcend the variations of particular cultures and are more essential still.

The dismissal of Socrates' midwifery seems hasty. First of all, Socrates not only helped the learner to bring forth ideas, but he also helped to criticize them as they were born. In the second place, inasmuch as Professor Burch also views education as a kind of birth process, one wonders why one obstetrical theory of education should be so cavalier in its treatment of another.

Professor Burch dismisses the notion of innate human tendencies to learn on the ground of student resistance, and he remarks that a child without teachers would become nothing at all . . . would not even learn to talk. But we all know

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HARRY S. BROUDY is a Professor of Philosophy and Education at The University of Illinois, Urbana, Illinois. *This article is a reply to "The Problem of Universals in Philosophy of Education" by George Burch, published in the July, 1957 issue of this journal. Both the paper by George Burch and the Comments by Harry Broudy were presented at a meeting of the Metaphysical Society of America at Fordham University, March 24, 1956.*

that student resistance is not to learning as such, but only to certain instances of teaching. College students learn very well, for example, how to meet course requirements without learning what their professors wish them to learn.

And is it so clear that children without teachers would become nothing? On the contrary, without teachers would they not become average members of the culture, absorbing it without conscious effort from their milieu? Indeed, if the species is the class of individuals belonging to it, then the untutored mass is closer to constituting the specific form than the liberally educated man. Even the wolf child became something, viz., a fair imitation of a wolf. There are, it seems to me, tendencies such as the urge to freedom, to self-realization, and self-integration that *can* be regarded as structural and functional constants in human personality. We need formal, deliberate, and purposeful education precisely because left to themselves these tendencies will develop, but not in the direction we might desire.

In other words, the alternatives that Professor Burch has rejected may turn out to be indispensable components of liberal education.

On the other hand, the comparison of education to biological reproduction leads to some difficulties:

Biologically, two groups are regarded as distinct species if their members cannot interbreed. If a culture is likened to a biological species, then is it to be defined as what can be handed down only to its progeny by a given set of ancestors? Are we to conclude that there is only one culture or many? If one, then doesn't the notion of an essential core of knowledge or wisdom unite the varieties comprised by a given species? If there are many cultures, are we to say that there are cultures which some human beings cannot learn?

If liberal education by which we "reproduce our culture" is free "just because it has no purpose," then why ". . . do we teach better if we understand what we are doing?" This seems to be unfaithful both to the denial of purpose and the spirit of biological reproduction.

Further, in what sense is the teacher an efficient cause of education? If he merely rehearses the activity of a free man in leisure before the pupil, he seems to be acting like a final cause, which, like Aristotle's prime mover or Toynbee's élite, move their objects by sheer charm.

The chief difficulty seems to lie in the equating of liberal education with life itself. Learning of some sort is an inevitable concomitant of sentient life, but education is perpetrated in cold blood by one generation upon another, and, as Professor Burch so well points out, never perfectly and against considerable resistance. For by living we almost automatically absorb our culture at a level that is required to live tolerably within that culture. It is only when people get the notion of living well in any culture that the problem of liberal education arises.

BOOK REVIEW

AN ADVENTURE IN EDUCATION: CONNECTICUT POINTS THE WAY. By Fred M. Hechinger (With a commentary by Norman Cousins). New York: The Mcamillan Company, 1956.

No more misunderstood doctrine exists today than that "the schools belong to the people." For, taken literally, this means that the schools should do whatever a majority or combination of pressure groups demand. While the schools are the prized possession of a majority of Americans, yet more of the schools than we might wish reflect dominant influences, the loudest demands, the reflected immediacies and urgencies pressed on and by school boards and school administrations for the sake of maintaining peace and quiet and a "forward looking" school system. Implicit in the belief that "the schools belong to the people" is the assumption that the public or some group of publics possess the standards for evaluating the educational process. Assuredly, the public schools are our schools, but what are the criteria we should employ in judging the significance and worth of the program of education in our schools?

It is one thing to affirm the belief that these standards are open to the public—open to the scrutiny of the public, but it is another thing to say that these standards are known and possessed by the public when they are engaged in an examination of the schools and the problems of the schools. Is there no competence needed in evaluating the public schools? Is there no specialization in the business of wielding standards of evaluation? What is this specialization? Who should be specialists in employing standards? What are these standards? What should be the standards for evaluating the public educational enterprize?

These basic questions are not significantly confronted in Fred Hechinger's report, "An Adventure in Education". Nor were these questions confronted in the original report of the Connecticut Fact-Finding Commission on Education. So many significant minds were involved in this state-wide investigation of the public schools (from the then-Governor Chester Bowles, Norman Cousins and Ernest Melby to the 38,000 and more citizens of Connecticut) that I hesitate to mention the above limitation as I see it, but philosophy, that perennial gadfly, prompts me.

The Commission's objective for American education, succinctly stated by Norman Cousins, Chairman of the Fact-Finding Commission, is to produce the Whole Man. If one of the central problems of American education is to educate children to be aware of a world-setting, then the purpose of education becomes one of producing a whole child, a whole man who "knows that the transcendent goal of education today is preparation for world citizenship under freedom." (pp. 21–22, 77). We can agree with this objective proposed by the Commission to the extent that we are aware of the kind of Whole Man we are trying to build in education. For there are many definitions of freedom and many definitions of world citizenship. Which of these definitions shall be preferred by American educators? The Whole Man of the East is different from the Whole Man of the West. And the Whole Man of the Soviets is different from either. To repeat the initial question of this review: what *standards of evaluation* shall be employed to distinguish which concepts of freedom and the Whole Man are to be preferred and fostered in the public schools?

Objectives for the child: the Commission proposes that the child should "Have a hand in determining the policies of his classroom and school . . .", and be "able to evaluate himself and his work because he has been guided to do so". (pp. 81–82). Again, what is necessary to guide children in the attainment of the ability to determine policy and evaluate themselves and their work? What is the subject matter of *evaluation*, the content of such a curriculum? And what kind of specialization is required of teachers in order that they accomplish this objective?

The Problems of Public Education in Connecticut: Mr. Hechinger indicates problems peculiar to local control of the schools in Connecticut; i.e., inequalities in the workings of representative government, that the Yankee part of the population has retained considerable political and social control, that Roman Catholic citizens slightly outnumber Protestants and the perpetuation of the myths of "race" and superiority of "old American stock." Again, what standards should be employed to evaluate the conflicting points of view that result from these problems, what standards should be employed to evaluate inequalities that exist in Connecticut? What standards of judgment will enable the school teachers to permit children to evaluate and judge among these conflicts and inequalities?

Finally, Mr. Hechinger indicates the central problem for those who undertake factual research when he states that:

> ". . . while theory, without the experience of field observation, is generally useless and often misleading, experience alone, without the consolidating wisdom of the theorist, provides only scattered peephole views instead of the entire panorama. Such bits and pieces fail to add up to a meaningful pattern . . ." (p. 68)

In other words, facts without theory are meaningless. Theory without facts is utopian, and the Connecticut Fact-Finding Commision fails to get the two together. The Commission took on the task and failed, but should be honored nonetheless, for having made the effort. The Commission proposes the objective of training children to evaluate discriminatingly and judge independently, but does not indicate how this is to be achieved. What are we checking the facts for? What are the standards, the criteria, the hypotheses that make sense of the facts? What is the purpose of American public education, and what *expert knowledge* is required to evaluate whether or not that purpose is being achieved?

To return to this much abused notion that the schools belong to the people and the implicit assumption that the people are skilled experts in the business of evaluation. If educators, the teachers, are not specialists in philosophies of education and the methods of evaluation disciplined in each philosophy (and they are not), and philosophy of education is not in the schools (and it is not—at least, not deliberately), teachers must be content to remain the "custodians" of public property and not the respected guardians of the heart of free inquiry and methods of evaluation of a free society. And until educators do appraise themselves of this specialization, perhaps it is best that the public (as in Connecticut) attempt to assume the responsibility for evaluating the educational program—no matter how nebulously the standards and criteria of evaluation are held. For at the very least, when the educational shoe pinches, even minority pressure groups might squeak.

OTTO KRASH

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